



AlphaServer DS25

Owner's Guide

Order Number: EK-DS250-UG. D01

This manual is for managers and operators of *HP AlphaServer* DS25 systems.

April 2003

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- EN61000-3-2 (IEC61000-3-2) – Power Line Harmonics
- EN61000-3-3 (IEC61000-3-3) – Power Line Flicker
- EN60950 (IEC60950) – Product Safety

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Preface

Intended Audience

This manual is for *HP AlphaServer DS25* systems.

Document Structure

This manual uses a structured documentation design. Topics are organized into small sections, usually consisting of two facing pages. Most topics begin with an abstract that provides an overview of the section, followed by an illustration or example. The facing page contains descriptions, procedures, and syntax definitions.

This manual has eight chapters.

- **Chapter 1, System Overview**, gives an overview of the system and describes the components.
- **Chapter 2, Operation**, gives basic operating instructions on powering up and configuring the machine, setting console security, and updating firmware.
- **Chapter 3, Booting and Installing an Operating System**, describes how to boot a supported operating system and how to begin an operating system installation.
- **Chapter 4, Configuring and Installing Components**, shows how to install memory DIMMs, CPUs, PCI cards, and other options.
- **Chapter 5, Firmware**, describes the SRM firmware, which allows you to configure and boot the *Tru64 UNIX*, Linux, or *OpenVMS* operating system and verify the configuration of devices. It also provides a reference to the SRM commands and environment variables.
- **Chapter 6, Remote Management**, describes the function and operation of the integrated remote management console.
- **Chapter 7, Troubleshooting**, gives basic troubleshooting procedures.
- **Chapter 8, Specifications**, gives system specifications.

Documentation Titles

Table 1 HP AlphaServer DS25 Documentation

Title	Order Number
User Documentation Kit	QA-6WEAA-G8
Owner's Guide	EK-DS250-UG
Documentation CD (6 languages)	AG-RT2DA-BE
Maintenance Kit	QA-6WEAB-G8
Service Guide	EK-DS250-SV
Loose Piece Items	
Basic Installation Card	EK-DS250-PD
Rackmount Installation Guide	EK-DS250-RG
Rackmount Installation Template	EK-DS250-TP
AlphaServer DS25 in a 9000 Series Cabinet Installation Information	EK-BA57R-IN

Information on the Internet

Visit the HP Web site at www.compaq.com for service tools and more information about the *AlphaServer* DS25 system.

Chapter 1

System Overview

This chapter provides an overview of the system, including:

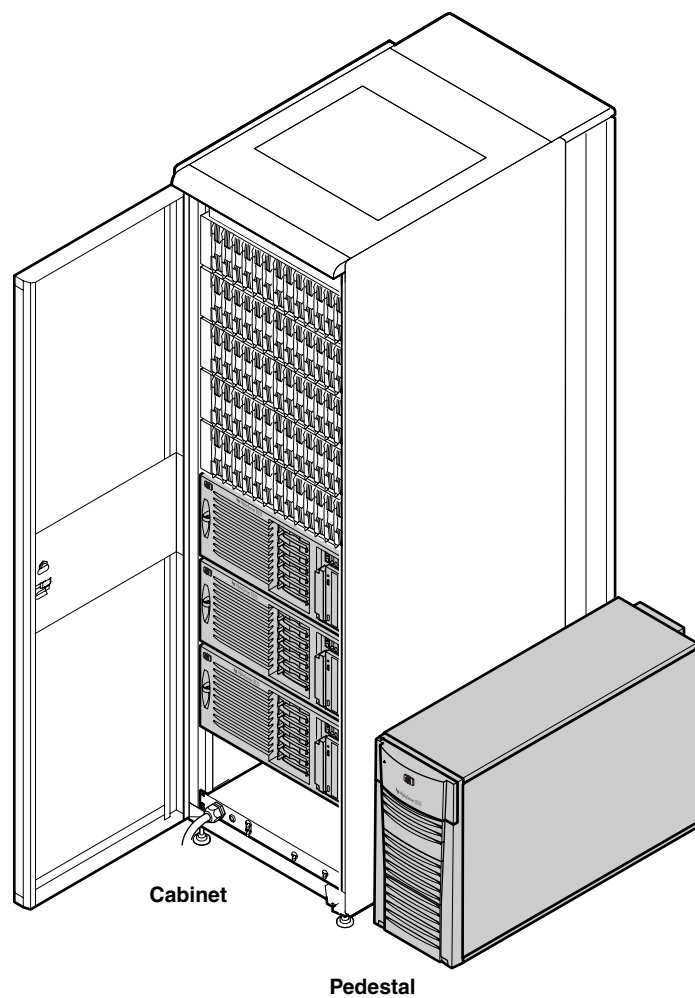
- System Enclosures
- System Chassis—Front View/Top View
- System Chassis—Rear View
- Rear Ports and Slots
- Operator Control Panel
- System Motherboard
- PCI Slots
- Power Supplies
- Power Requirements
- Removable Media Storage
- Storage Subsystem
- System Access (pedestal)
- Console Terminal

NOTE: *See Chapter 4 for warnings and procedures for accessing internal parts of the system.*

1.1 System Enclosures

The DS25 family consists of a standalone pedestal with expanded storage capacity, and a rackmount system.

Figure 1-1 DS25 Systems



MR0316A

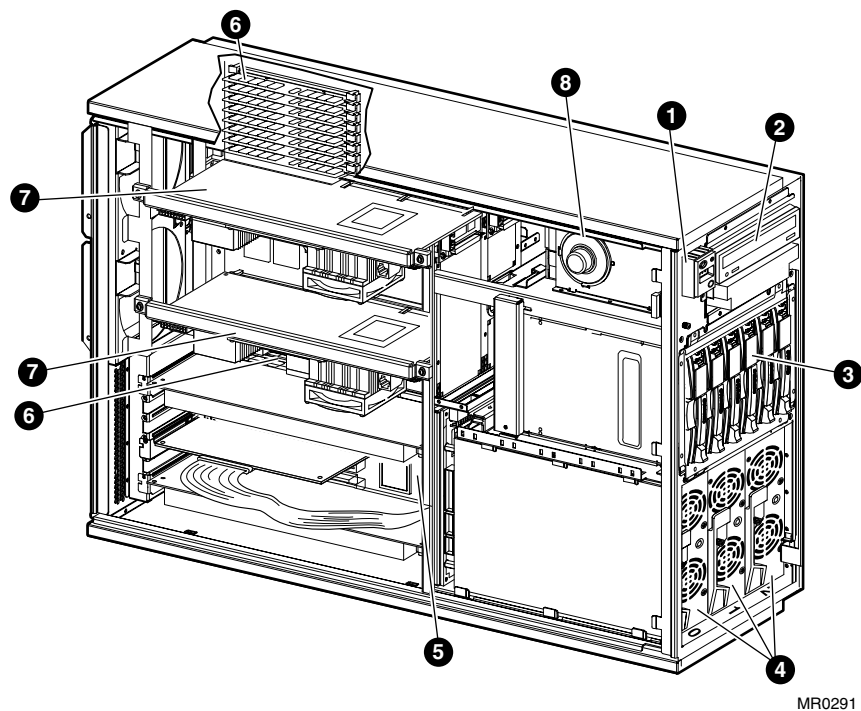
Common Components

The basic building block of the system is the chassis, which houses the following common components:

- Up to two CPUs (EV68 Alpha chip)
- 200-pin memory DIMMs (up to 16 with a minimum of 4)
- I/O (located on system motherboard) with six 64-bit PCI slots:
 - Four hot-swap PCI slots with two at 66 MHz (3.3 V) and two at 33 MHz (5.0 V).
- CD-ROM read/write drive
- One storage cage that houses up to six 1-inch universal drives
- Up to three power supplies, offering N+1 power
- A 25-pin parallel port, two 9-pin serial ports, mouse and keyboard ports
- An operator control panel with:
 - Diagnostic LEDs
 - Power button with green LED
 - Halt button with amber LED
 - Reset button

1.2 System Chassis—Front View/Top View

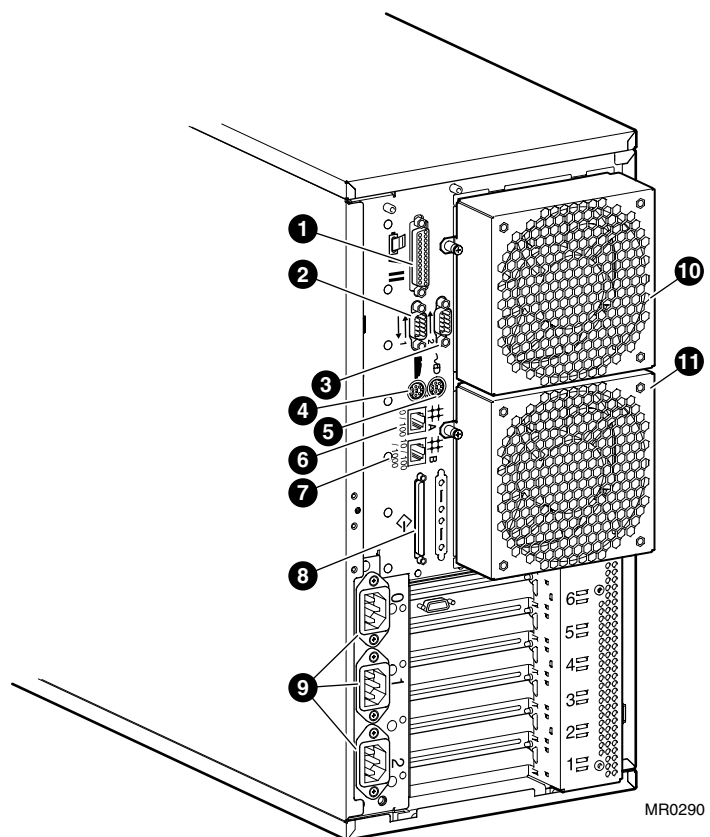
Figure 1-2 Top/Front Components (Pedestal)



- ❶ Operator control panel
- ❷ CD-ROM read/write drive
- ❸ Hard disk drives
- ❹ Power supplies
- ❺ System motherboard
- ❻ Memory
- ❼ CPUs
- ❽ Speaker

1.3 Rear Ports and Slots

Figure 1-3 Rear Connectors



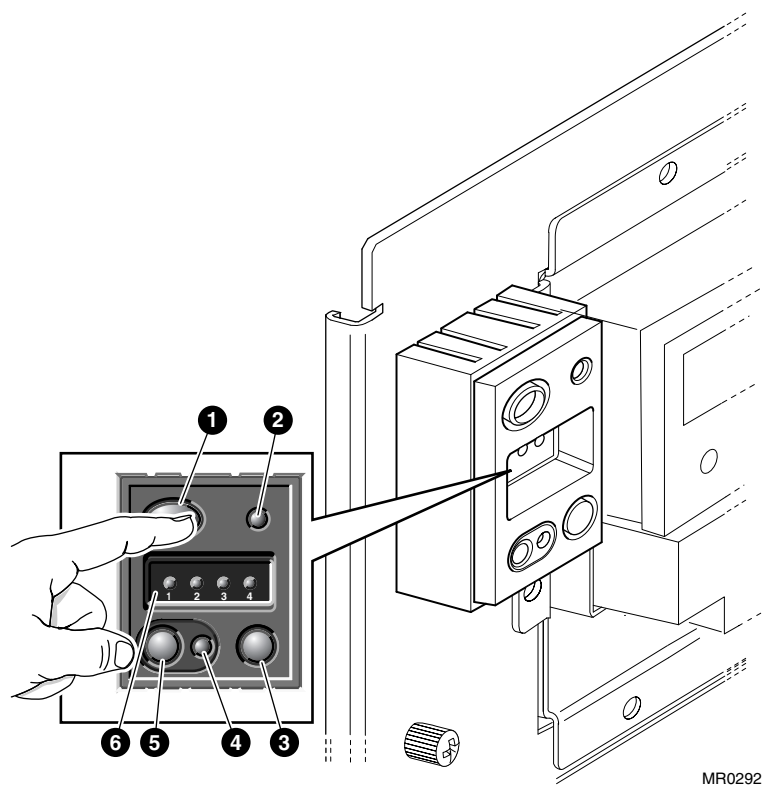
Rear Panel Connections

- ❶** Parallel port
- ❷** Serial port (COM2)
- ❸** Serial port (COM1)
- ❹** Keyboard port
- ❺** Mouse port
- ❻** Ethernet A (10/100)
- ❼** Ethernet B (10/100/1000)
- ❽** SCSI breakout
- ❾** AC power outlets
- ❿** System fan 0
- ⓫** System fan 1

1.4 Operator Control Panel

The control panel provides system controls and status indicators. The controls are the Power, Halt, and Reset buttons. The panel has a green power LED, a yellow halt LED, and four diagnostic LEDs.

Figure 1-4 Operator Control Panel



- ❶ Power button. This button is a latching switch. Pressing the Power button on powers up the system. Pressing the button to standby turns off all DC voltages except Aux 5 volts. The 5 volt standby powers the remote management console (RMC). See Chapter 6.
- ❷ Power LED (green). Lights when the Power button is pressed.
- ❸ Reset button. A latch contact switch that restarts the system and reinitializes the console firmware.
- ❹ Halt LED. Halt condition (yellow). Lights when you press the Halt button.
- ❺ Halt button. Halts the system. Latching contact switch.
- ❻ Diagnostic LEDs. Programmable by software. Blink at various console states. See Chapter 7 for details.

Remote Commands

Commands issued from the remote management console (RMC) can be used to reset, halt, and power the system on or off. For information on RMC, see Chapter 6.

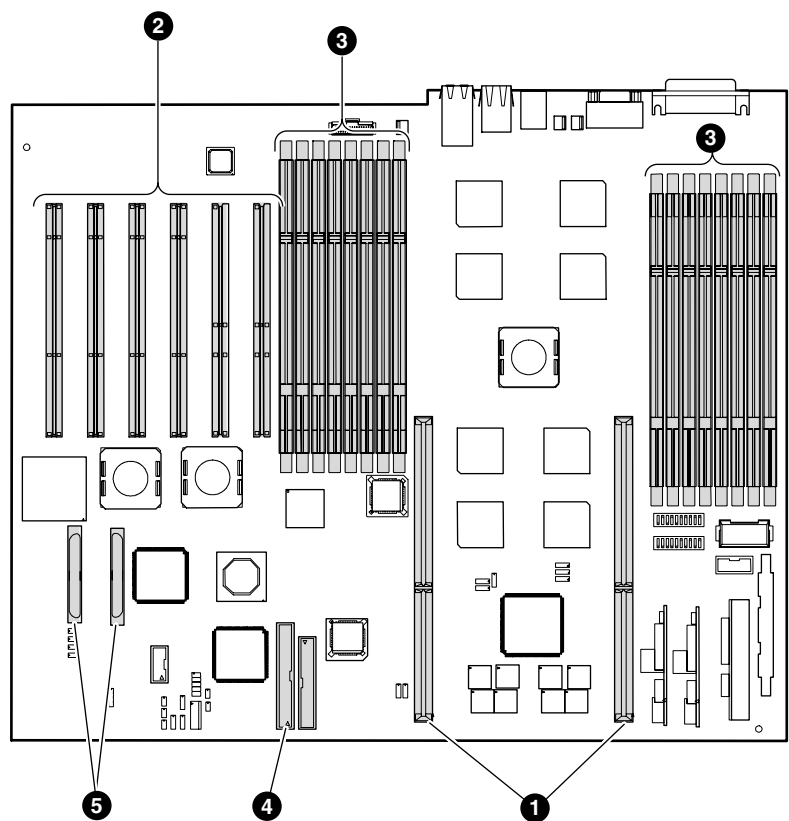
RMC Command	Function
Poweron	Turns on power. Emulates pressing the Power button to the On position.
Poweroff	Turns off power. Emulates pressing the Power button to the Off position.
Halt	Halts the system.
Haltin	Halts the system and causes the halt to remain asserted.
Haltout	Releases a halt created with haltin .
Reset	Resets the system. Emulates pressing the Reset button.

1.5 System Motherboard

The system motherboard has the majority of the logic for the system. It is located on the floor of the system card cage in rack systems and is vertical and on the right side for the pedestal systems.

The system motherboard has connectors for the CPUs and DIMMs. Figure 1–5 shows these locations on the motherboard.

Figure 1–5 System Motherboard Block Diagram



MR0293

See Figure 1–5 for sections of the motherboard:

- ❶ CPU slots (CPU 0 is right slot).
- ❷ I/O slots
- ❸ Memory slots
- ❹ IDE
- ❺ SCSI

All components are on a single system motherboard that contains a memory subsystem, PCI bus, integrated dual Ultra3 SCSI controllers, and slots for PCI options.

CPU Module

The system can have up to two CPU modules. The CPU modules are installed on the system motherboard. Each module contains an Alpha EV68 microprocessor.

The microprocessor is a superscalar CPU with out-of-order execution and speculative execution to maximize speed and performance. It contains four integer execution units and dedicated execution units for floating-point add, multiply, and divide. It has an instruction cache and a data cache on the chip. Each cache is a 64 KB, two-way, set-associative, virtually addressed cache that has 64-byte blocks. The data cache is a physically tagged, write-back cache.

Each CPU module has an 8 MB Level 2 B-cache (backup cache) and a power regulator. See Chapter 4 for instructions on installing CPUs.

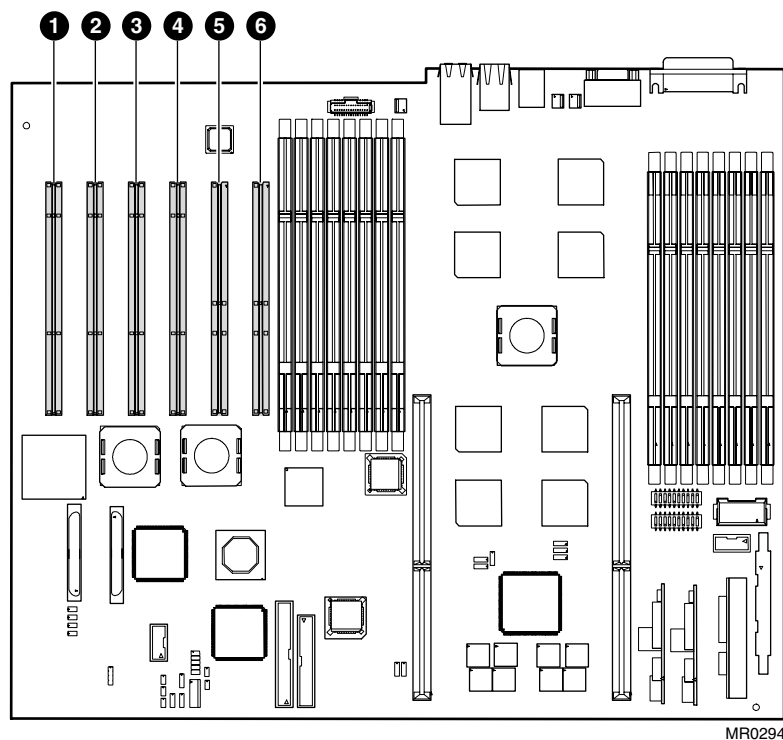
DIMMs

The system supports up to 16 DIMMs. Each array contains four slots. The system uses 200-pin buffered synchronous dual in-line memory modules (DIMMs). (See Chapter 4 for instructions on installing DIMMs.)

1.6 PCI Slots

The system motherboard has six, 64-bit PCI slots. The callouts in Figure 1-6 show the PCI slot locations. In systems with part numbers Dx-57AAA-xx, slot 6 supports a half-length card only. In systems with part numbers Dx-57AAB-xx, slot 6 supports full-length cards. Slots 1 through 5 support full-length cards.

Figure 1-6 PCI Slots



There is no direct correspondence between the physical numbers of the slots and the logical slot identification reported with the SRM console **show config** command (described in Chapter 2). Table 1–1 maps the physical slot numbers to the SRM logical ID numbers.

See Chapter 4 for instructions on installing PCI options.

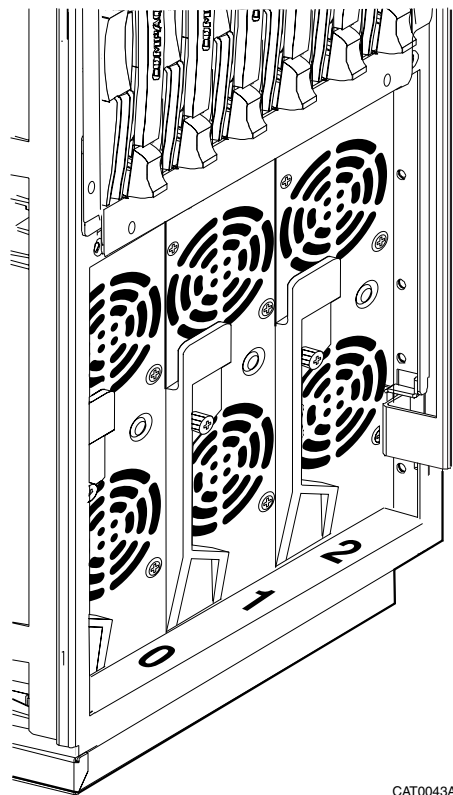
Table 1–1 How Physical I/O Slots Map to Logical Slots

Physical Slot	SRM Logical ID
1	Hose 1 Slot ID 1
2	Hose 1 Slot ID 2
3	Hose 3 Slot ID 2
4	Hose 3 Slot ID 1
5	Hose 0 Slot ID 9
6	Hose 0 Slot ID 10

1.7 Power Supplies

Depending on the system model and amount of memory, either two or three power supplies are required. Systems with two supplies can add a third power supply for redundancy.

Figure 1-7 Power Supplies



CAT0043A

A power backplane integrates the supplies for power distribution, monitoring, and control. The power supplies can be accessed and removed from the front of the enclosure. See Chapter 4 for instructions on adding or replacing a power supply.

The following voltages are provided: +3.3, +5.0, +12.0, -12.0 Aux (+5.0 Aux always powered). Two internal fans for each power supply cool the power supply. The fans are temperature controlled and speed up as the power supply temperature increases.

Systems containing model FR-H7910-AA power supplies (part number 30-50662-01) require a minimum of three power supplies if the system contains more than 8GB of memory.

Systems containing model 3X-H7911-AA power supplies (part number 30-10047-01) require a minimum of two power supplies. A third supply may be added for redundancy (see next section).

N+1 Power Supply Configuration

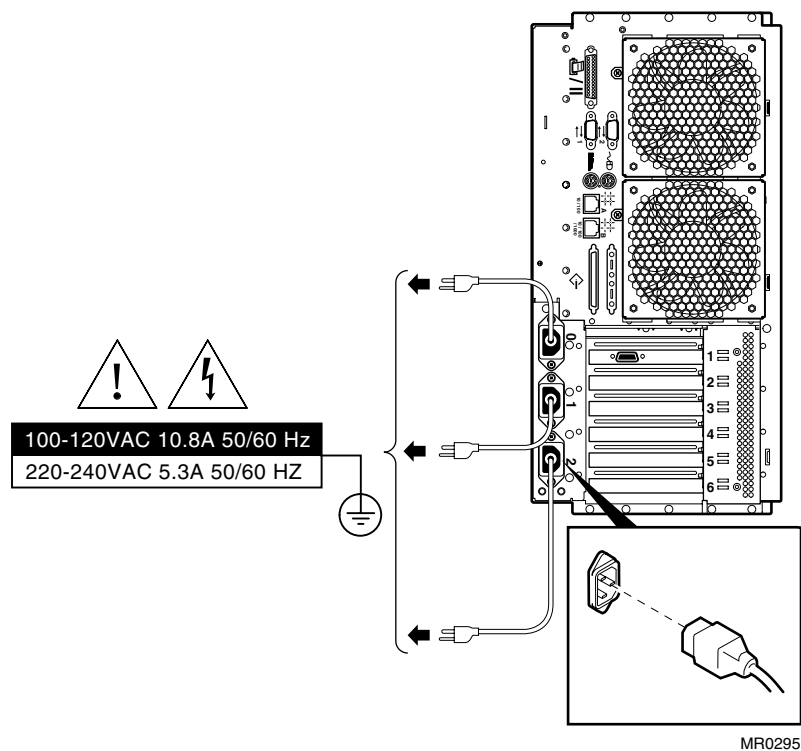
In a redundant configuration (three 3X-H7911-AA supplies), a power supply may be removed for servicing without interrupting system operation. An I/O interrupt is generated whenever the number of power supplies in operation changes.

Two power supplies must be installed and working for the system to operate. The system shuts down if the number of working power supplies ever falls below two.

1.8 Power Requirements

The system automatically detects the voltage source when it powers up (auto-sensing from 100 V – 240 V) and adjusts the power supply input to accept that voltage. Figure 1–8 shows the maximum current ratings for a fully loaded system (without monitor or terminal). It also shows where to plug in the AC power cords. Power supply ratings and power cord requirements are in Chapter 8.

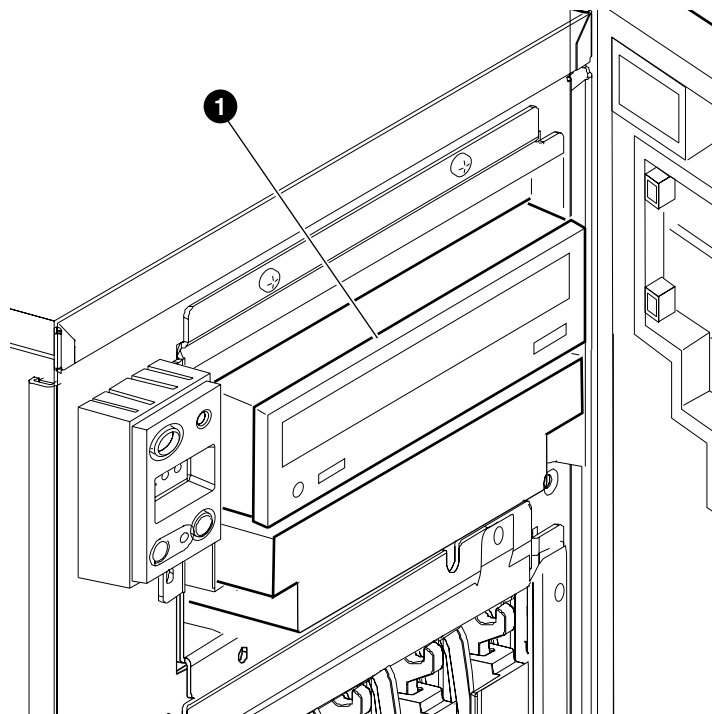
Figure 1–8 Power Supply Requirements



1.9 Removable Media Storage

The system chassis houses a CD-ROM read/write drive ❶.

Figure 1-9 Removable Media Drive Area



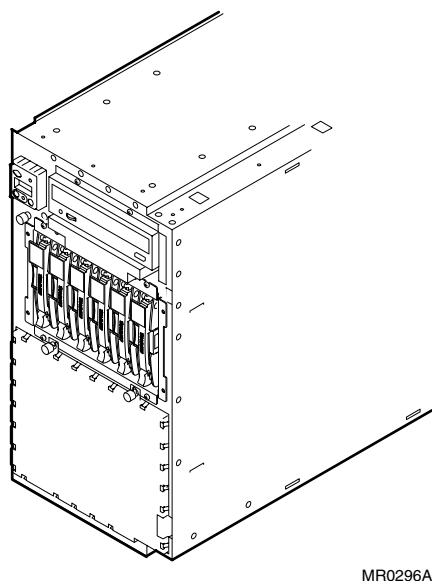
CAT0050A

1.10 Storage Subsystem

The system comes with a six-slot storage subsystem that holds 1-inch drives.

You can install up to six 1-inch universal hard drives in the storage disk cage. See Chapter 4 for installation and swap procedures.

Figure 1-10 Storage Cage

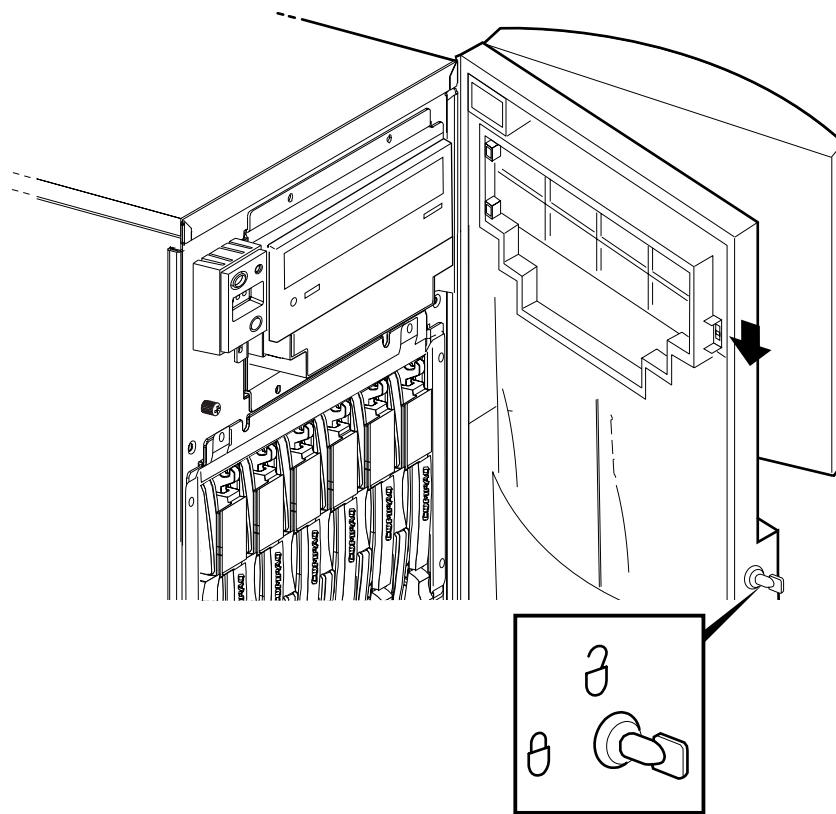


The storage system backplane contains on-board multimode terminators that provide LVD (low voltage differential) termination to the bus when all devices are LVD. If an SE (single-ended) device is installed in the backplane, the terminators automatically switch to SE mode termination. All devices on the bus will operate in SE mode and all transactions will be subject to SE speed and length limitations.

1.11 System Access (Pedestal)

At the time of delivery, the system keys are taped inside the small front door that provides access to the operator control panel and removable media devices.

Figure 1-11 System Keys

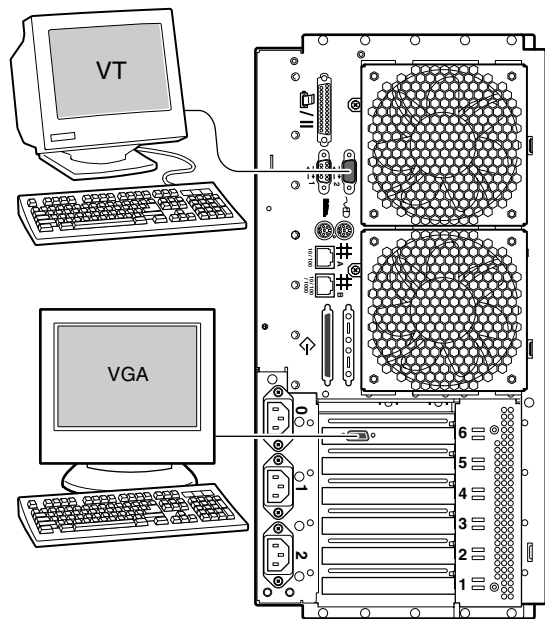


CAT0024A

1.12 Console Terminal

The console terminal can be a serial (character cell) terminal connected to the COM1 or COM2 port or a VGA monitor connected to a VGA adapter. A VGA monitor requires a keyboard and mouse.

Figure 1-12 Console Terminal Connections



MR0297

Chapter 2

Operation

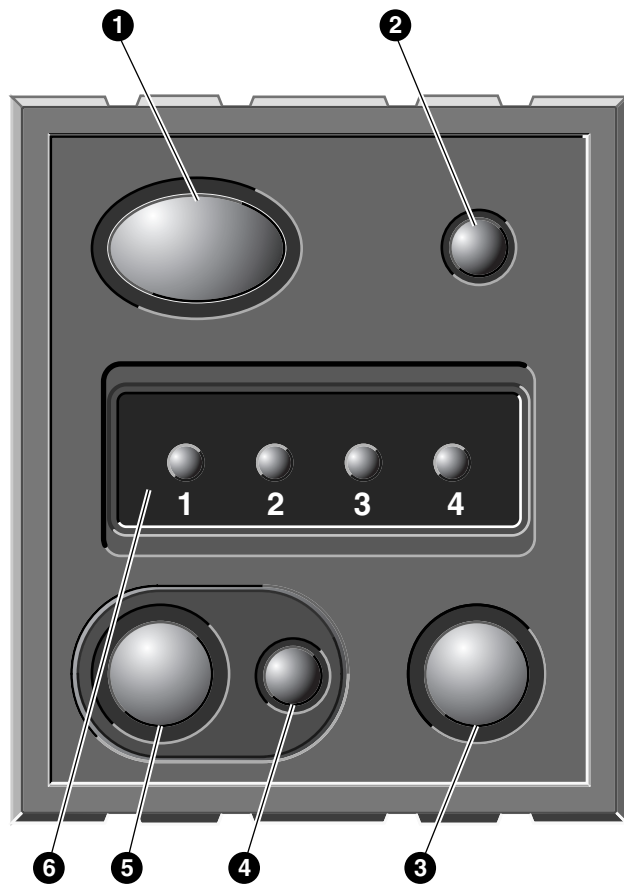
This chapter gives instructions for basic system operation. The following topics are covered:

- Powering Up the System
- Power-Up Displays
- SRM Console
- Displaying the Hardware Configuration
- Setting SRM Environment Variables
- Setting Console Security
- Updating Firmware

2.1 Powering Up the System

To power up the system, press the power button. Testing begins, and status shows on the console terminal screen and in the control panel display.

Figure 2-1 Operator Control Panel



- ❶ Power button
- ❷ Power LED (Green)
- ❸ Reset button
- ❹ Halt LED
- ❺ Halt button
- ❻ Diagnostic LEDs

2.2 Power-Up Displays

Power-up information is displayed on the operator control panel LEDs and on the console terminal startup screen. Messages sent from the SROM (serial read-only memory) program are displayed first, followed by messages from the SRM console.

NOTE: *The power-up text that is displayed on the screen depends on what kind of terminal is connected as the console terminal: VT or VGA.*

*If the SRM **console** environment variable is set to **serial**, the entire power-up display, consisting of the SROM and SRM power-up messages, is displayed on the VT terminal screen. If **console** is set to **graphics**, SROM messages are not displayed, and the SRM messages are delayed until VGA initialization has completed. If the COM1_mode is set to **through**, RMC will also display power-up and fatal messages.*

2.2.1 RMC Power-Up Display

Example 2-1 RMC Power-Up Display

```
RMC - System is Down
RMC - Starting to Test Max Fan Speeds
RMC - Power Supplies OK
RMC - System DC is OK
RMC - System is up
RMC - System Fans OK
RMC - Powerup Complete
```

2.2.2 SROM Power-Up Display

Example 2-2 Sample SROM Power-Up Display

```
SROM V1.3-F CPU # 00 @ 1000 MHz
SROM program starting
Reloading SROM
SROM V1.3-F CPU # 00 @ 1000 MHz
System Bus Speed @ 0125 MHz
SROM program starting
PCI66 bus speed check
Starting secondary on CPU #1
Bcache data tests in progress
Bcache address test in progress
CPU parity and ECC detection in progress
Bcache ECC data tests in progress
Bcache TAG lines tests in progress
Memory sizing in progress
Memory configuration in progress
Testing AAR0
Memory data test in progress
Memory address test in progress
Memory pattern test in progress
Memory thrashing test in progress
Memory initialization
Loading console
Code execution complete (transfer control)
```

2.2.3 SRM Console Power-Up Display

At the completion of SROM power-up, the primary CPU transfers control to the SRM console program, described in Section 2.3. The console program continues the system initialization. Failures are reported to the console terminal through the power-up screen and a console event log.

Example 2-3 SRM Power-Up Display

OpenVMS PALcode V1.96-40, Tru64 UNIX PALcode V1.90-31

❶

```
starting console on CPU 0
initialized idle PCB
initializing semaphores
initializing heap
initial heap 240c0
memory low limit = 218000 heap = 240c0, 17fc0
initializing driver structures
initializing idle process PID
initializing file system
initializing timer data structures
lowering IPL
CPU 0 speed is 1000 MHz
create dead_eater
create poll
create timer
create powerup
access NVRAM
1536 MB of System Memory
```

Testing Memory

❷

...

probe I/O subsystem

❸

```
Hose 0 - PCI bus running at 33Mhz
entering idle loop
probing hose 0, PCI
probing PCI-to-ISA bridge, bus 1
bus 0, slot 8 -- eia -- Intel 82559ER Ethernet
bus 0, slot 16 -- dqa -- Acer Labs M1543C IDE
bus 0, slot 16 -- dqb -- Acer Labs M1543C IDE
Hose 1 - PCI bus running at 66Mhz
probing hose 1, PCI
Hose 2 - PCI bus running at 66Mhz
probing hose 2, PCI
bus 0, slot 1, function 0 -- pka -- Adaptec AIC-7899
bus 0, slot 1, function 1 -- pkb -- Adaptec AIC-7899
bus 0, slot 5 -- ega -- BCOM Gigabit 5703c
```

Hose 3 - PCI bus running at 33Mhz
probing hose 3, PCI
starting drivers

④

- ❶ The primary CPU prints a message indicating that it is running the console. Starting with this message, the power-up display is sent to any console terminal, regardless of the state of the **console** environment variable.

If console is set to **graphics**, the display from this point on is saved in a memory buffer and displayed on the VGA monitor after the PCI buses are sized and the VGA device is initialized.

- ❷ The memory size is determined and memory is tested.
- ❸ The I/O subsystem is probed and I/O devices are reported. I/O adapters are configured.
- ❹ Device drivers are started.

Continued on next page

Example 2-3 SRM Power-Up Display (Continued)

```
starting console on CPU 1
initialized idle PCB
initializing idle process PID
lowering IPL
CPU 1 speed is 1000 MHz
create powerup
initializing GCT/FRU at 23e000
Initializing ega dqa dqb eia pka pkb

Memory Testing and Configuration Status
  Array      Size      Base Address      Intlv Mode
-----
    0         512Mb    00000000040000000    1-Way
    2         1024Mb   00000000000000000    1-Way

    1536 MB of System Memory
Testing the System
Testing the Disks (read only)
Testing the Network
AlphaServer DS25 Console V6.3-1, built on Jun 10 2002 at
11:51:30
P00>>>
```

- ⑤ The console is started on the secondary CPU. The example shows a two-processor system.
- ⑥ Various diagnostics are performed.
- ⑦ The console terminal displays the SRM console banner and the prompt, *Pnn>>>*. The number *n* indicates the primary processor. In a multiprocessor system, the prompt could be P00>>> or P01>>>. From the SRM prompt, you can boot the operating system.

2.3 SRM Console

The SRM console is the command-line interface that allows you to set up and boot the operating system, display the system configuration, set environment variables, and perform basic system troubleshooting. SRM firmware is located in a flash ROM (read-only memory) on the system board. The SRM console firmware is described in detail in Chapter 5, Firmware.

The following sections cover functions you can perform from the SRM console.

Example 2-4 SRM Console Example

```
P00>>> set bootdef_dev dkb0,dka0
```

In this example, the operator enters the SRM **set** command and specifies the devices from which to boot the operating system. At power-up the system will try to boot from SCSI device dkb0 and if unsuccessful, will boot from dka0.

2.3.1 Selecting the Display Device

The SRM console environment variable determines to which display device (VT-type terminal or VGA monitor) the console display is sent.

The console terminal that displays the SRM user interface can be either a serial terminal (VT320 or higher, or equivalent) or a VGA monitor.

The SRM **console** environment variable determines the display device.

- If you use a VT-type device as the console terminal, set the **console** environment variable to **serial**. The VT device should be connected to the serial port COM1 or COM2.
- If you use a VGA monitor as the console terminal, set the **console** environment variable to **graphics**.

You can verify the display device with the SRM **show console** command and change the display device with the SRM **set console** command. If you change the display device setting, you must reset the system (with the Reset button or the **init** command) to put the new setting into effect.

In the following example, the operator displays the current console device (a graphics device) and then resets it to a serial device. After the system initializes, output will be displayed on the serial terminal.

```
P00>>> show console
console          graphics
P00>>> set console serial
P00>>> init
.
.
.
```

2.4 Displaying the Hardware Configuration

View the system hardware configuration from the SRM console. It is useful to view the hardware configuration to ensure that the system recognizes all devices, memory configuration, and network connections.

Use the following SRM console commands to view the system configuration:

- | | |
|--------------------|---|
| show boot* | Displays the boot environment variables. |
| show config | Displays the logical configuration of interconnects and buses on the system and the devices found on them. |
| show device | Displays the bootable devices and controllers in the system. |
| show fru | Displays the physical configuration of FRUs (field-replaceable units). See Chapter 5 for information on this command. |
| show memory | Displays configuration of main memory. |

2.4.1 Displaying Boot Environment Variables

Use the `show boot*` command to list the boot environment variables. Use the `set` command with a variable to set up the boot environment. See Chapter 3 for more information on setting boot environment variables.

Example 2-5 Show Boot*

```
P00>>> show boot*
boot_dev          dka0.0.0.1.1
boot_file
boot_osflags      a
boot_reset        OFF
bootdef_dev       dka0.0.0.1.1
booted_dev
booted_file
booted_osflags
```

boot_dev	Device or device list from which booting is to be attempted, here SCSI device dka0.
boot_file	The default file name used for the primary bootstrap when no file name is specified by the boot command.
boot_osflags	Boot flags, here the <i>Tru64 UNIX</i> “a” (autoboot) flag.
boot_reset	Action taken in response to an error halt or boot command. OFF, the default, indicates a warm boot (no full reset is performed).
bootdef_dev	Device or device list from which booting is to be attempted when no path is specified on the command line. Here, SCSI device dka0.
booted_dev	The device from which booting occurred.
booted_file	The file name used for the primary bootstrap during the last boot.
booted_osflags	Additional parameters, if any, specified by the last boot command that are to be interpreted by system software.

2.4.2 Displaying the Logical Hardware Configuration

Use the **show config** command to display the logical configuration. To display the physical configuration, issue the **show fru** command.

Example 2-6 Show Config

```
P00>>> sho config
hp AlphaServer DS25

Firmware
SRM Console: V6.3-1
PALcode: OpenVMS PALcode V1.96-40, Tru64 UNIX PALcode V1.90-31
Serial ROM: V1.3-F
RMC ROM: G1.4
RMC Flash ROM: V1.1

Processors
CPU 0 Alpha EV68CB pass 2.4 1000 MHz 8MB Bcache
CPU 1 Alpha EV68CB pass 2.4 1000 MHz 8MB Bcache

Core Logic
Cchip Rev 18
Dchip Rev 17
PPchip 0 Rev 17
PPchip 1 Rev 17
TIG Rev 2.6

Memory
Array Size Base Address Intlv Mode
-----
0 512Mb 0000000040000000 1-Way
2 1024Mb 0000000000000000 1-Way

1536 MB of System Memory

Slot Option Hose 0, Bus 0, PCI - 33 MHz
7 Acer Labs M1543C Bridge to Bus 1, ISA
8 Intel 82559ER Ethernet 00-02-A5-20-00-DD
12 Yukon PCI Hot-Plug C
16 Acer Labs M1543C IDE dqa.0.0.16.0
dqb.0.1.16.0
dqa0.0.0.16.0 CD-224E

Option
Floppy Hose 0, Bus 1, ISA
dva0.0.0.1000.0

Slot Option Hose 2, Bus 0, PCI - 66 MHz
1/0 Adaptec AIC-7899 pka0.7.0.1.2 SCSI Bus ID 7
dka0.0.0.1.2 COMPAQ BD01862A67
```

```

1/1  Adaptec AIC-7899          dka100.1.0.1.2      COMPAQ BF01863644
5    BCOM Gigabit 5703c       pkb0.7.0.101.2     SCSI Bus ID 7
                                ega0.0.0.5.2       00-02-A5-20-7F-AC

Slot  Option                  Hose 3, Bus 0, PCI - 66 MHz
1    ELSA GLoria Synergy      vga0.0.0.1.3
6    Yukon PCI Hot-Plug C
P00>>>

```

- ❶ **Firmware.** Version numbers of the SRM console, PALcode, serial ROM, RMC ROM, and RMC flash ROM
- ❷ **Processors.** Processors present, processor version and clock speed, and amount of backup cache
- ❸ **Core logic.** Version numbers of the chips that form the interconnect on the system board
- ❹ **Memory.** Memory arrays and memory size
- ❺ This part of the command output shows the PCI buses.

The “Slot” column lists the slots (logical IDs) seen by the system. Logical IDs identify both installed PCI cards and onboard chips. In this example, the onboard chips include the Yukon PCI hot-plug controller and the Acer Labs M1543C IDE. The logical IDs do not correspond directly to the physical slots into which the devices are installed. See Table 2–1 for the correspondence between logical IDs and physical slots.

The slots in Example 2–6 are explained below.

NOTE: The naming of devices (for example, dqa.0.0.16.0) follows the conventions given in Table 2–2.

Hose 0, Bus 0, PCI

```

Slot 7      Onboard Acer chip. Provides bridge to Bus 1
Slot 8      Onboard Ethernet
Slot 12     Onboard PCI hot-plug controller
Slot 16     Onboard Acer chip

```

Hose 0, Bus 1

Hose 2, Bus 0, PCI

```

Slots 1/0, 1/1  Adaptec controller.
Slot 5          Broadcom gigabit Ethernet controller

```

Hose 3, Bus 0, PCI

```

Slot 1      ELSA Gloria Synergy
Slot 6      Onboard PCI hot-plug controller

```

Table 2-1 How Physical I/O Slots Map to Logical Slots

Physical Slot	SRM Logical Slot ID
1	Hose 1 Slot ID 1
2	Hose 1 Slot ID 2
3	Hose 3 Slot ID 2
4	Hose 3 Slot ID 1
5	Hose 0 Slot ID 9
6	Hose 0 Slot ID 10

2.4.3 Displaying the Bootable Devices

Use the **show device** command to display the devices from which the operating system can be booted.

Example 2-7 Show Device

```
P00>>> show device
```

dqa0.0.0.16.0	DQA0	HL-DT-ST GCE-8302B 2.01
dva0.0.1000.0*	DVA0	
ega0.0.0.5.2	EGA0	00-00-00-00-00-00
eia0.0.0.8.0	EIA0	40-00-04-A5-F8-00
pka0.7.0.1.2	PKA0	SCSI Bus ID 7
pkb0.7.0.101.2	PKB0	SCSI Bus ID 7

```
P00>>>
```

* DS25 systems have no floppy drive.

Table 2-2 Device Naming Conventions

Category		Description
The device, dqa0 is used as an example in the following device category and description.		
dq	Driver ID	Two-letter designator of port or class driver
	dk	SCSI drive or CD
	ew	Ethernet port
	dq	IDE CD-ROM
	fw	FDDI device
	dr	RAID set device
	mk	SCSI tape
	du	DSSI disk
	mu	DSSI tape
	dv	Diskette drive
	pk	SCSI port
	eg	Ethernet port
	pu	DSSI port
	ei	Ethernet port
	pz	KZPCC-CE RAID controller
a	Storage adapter ID	One-letter designator of storage adapter (a, b, c...).
0	Device unit number	Unique number (MSCP unit number). SCSI unit numbers are forced to 100 X node ID.
0	Bus node number	Bus node ID.
0	Channel number	Used for multi-channel devices.
16	Logical slot number	Corresponds to logical slot number, as shown in Example 2-7.
0	Hose number	Hose 0, 1, 2, or 3

2.4.4 Viewing the Memory Configuration

Use the **show memory** command to view the configuration of main memory.

Example 2-8 Show Memory

```
P00>>> show memory
  Array      Size      Base Address      Intlv Mode
-----
    0        1024Mb    0000000000000000      1-Way

    1024 MB of System Memory
P00>>>
```

The **show memory** display corresponds to the memory array configuration described in Chapter 4. The display does not indicate the number of DIMMs or the DIMM size.

The output of the **show memory** command also provides the memory interleaving status of the system.

Use the **show fru** command to display the DIMMs in the system and their location. See Chapter 5.

2.5 Setting SRM Environment Variables

You may need to set several SRM console environment variables and built-in utilities to configure the system.

Set environment variables at the P00>>> prompt.

- To check the setting for a specific environment variable, enter the **show *envar*** command, where the name of the environment variable is substituted for *envar*. To see a list of the environment variables, enter the **show *** command.
- To reset an environment variable, use the **set *envar*** command, where the name of the environment variable is substituted for *envar*.

The environment variables used to set up the boot environment are described in Chapter 3. Chapter 5 covers other environment variables you are likely to use.

2.6 Setting Console Security

You can set the SRM console to secure mode to prevent unauthorized persons from modifying the system parameters or otherwise tampering with the system from the console.

When the SRM is set to secure mode, you can use only two console commands:

- The **boot** command, to boot the operating system.
- The **continue** command, to resume running the operating system if you have inadvertently halted the system.

The **boot** command cannot take command-line parameters when the console is in secure mode. The console boots the operating system using the environment variables stored in NVRAM (**boot_file**, **bootdef_dev**, **boot_flags**).

The console security commands are as follows:

set password	These commands put the console into secure mode.
set secure	
clear password	Exits secure mode.
login	Turns off console security for the current session. Once you enter the login command in secure mode, you can enter any SRM command as usual. However, the system automatically returns to secure mode when you enter the boot or continue command or when you reset the system.

NOTE: *The security features work only if access to the system hardware is denied to unauthorized persons. Be sure the system is available only to authorized persons.*

2.6.1 Setting the Console Password

Set the console password with the set password command. A password is required for operating the system in secure mode.

Example 2-9 Set Password

```
P00>>> set password ❶
Please enter the password:
Please enter the password again:
P00>>>

P00>>> set password ❷
Please enter the password:
Please enter the password again:
Now enter the old password:
P00>>>

P00>>> set password
Please enter the password:
Password length must be between 15 and 30 characters ❸
P00>>>
```

The **set password** command sets the console password for the first time or changes an existing password. It is necessary to set the password only if the system is going to operate in secure mode.

The syntax is:

set password

- ❶ Setting a password. If a password has not been set and the **set password** command is issued, the console prompts for a password and verification. The password and verification are not echoed.
- ❷ Changing a password. If a password has been set and the **set password** command is issued, the console prompts for the new password and verification, then prompts for the old password. The password is not changed if the validation password entered does not match the existing password stored in NVRAM.
- ❸ The password length must be between 15 and 30 alphanumeric characters. Any characters entered after the 30th character are not stored.

2.6.2 Setting the Console to Secure Mode

To set the console to secure mode, first set the password. Then enter the **set secure** command. The system immediately enters secure mode.

Example 2-10 Set Secure

```
P00>>> set secure ❶
Console is secure. Please login.
P00>>> b dkb0
Console is secure - parameters are not allowed.
P00>>> login ❷
Please enter the password:
P00>>> b dkb0
(boot dkb0.0.0.3.1)
.
.
.
```

The **set secure** command enables secure mode. If no password has been set, you are prompted to set the password. Once you set a password and enter the **set secure** command, secure mode is in effect immediately and only the **continue**, **boot** (using the stored parameters), and **login** commands can be performed.

The syntax is:

set secure

- ❶ The console is put into secure mode, and then the operator attempts to boot the operating system with command-line parameters. A message is displayed indicating that boot parameters are not allowed when the system is in secure mode.
- ❷ The **login** command is entered to turn off security features for the current console session. After successfully logging in, the operator enters a **boot** command with command-line parameters.

2.6.3 Turning Off Security During a Console Session

The **login** command turns off the security features, enabling access to all SRM console commands during the current console session. The system automatically returns to secure mode as soon as the boot or continue command is entered or when the system is reset.

Example 2-11 Login

```
P00>>> login                                ❶
Secure not set. Please set the password.
P00>>> set password                          ❷
Please enter the password:
Please enter the password again:
P00>>> login                                ❸
Please enter the password.
P00>>> show boot*
```

- ❶ The **login** command is entered, but the system is not in secure mode. A password must be set.
- ❷ A password is set.
- ❸ The **login** command is entered. After the password is entered, console security is turned off for the current session and the operator can enter commands.

When you enter the **login** command, you are prompted for the current system password. If a password has not been set, a message is displayed indicating that there is no password in NVRAM. If a password has been set, this prompt is displayed:

Please enter the password:

If the password entered matches the password in NVRAM, when the prompt is redisplayed the console is no longer in secure mode and all console commands can be performed during the current console session.

If You Forget the Password

If you forget the current password, use the **login** command in conjunction with the control panel Halt button to clear the password, as follows:

1. Enter the **login** command:

```
P00>>> login
```

2. When prompted for the password, press the Halt button to the latched position and then press the Return (or Enter) key.
3. Press the Halt button to release the halt. The password is now cleared and the console cannot be put into secure mode unless you set a new password.

2.6.4 Returning to User Mode

The **clear password** command clears the password environment variable, setting it to zero. Once the password is cleared, you are returned to user mode.

Example 2-12 Clear Password

```
P00>>> clear password
Please enter the password:
Console is secure
P00>>> clear password
Please enter the password:
Password successfully cleared.
P00>>>
```

❶

❷

- ❶ The wrong password is entered. The system remains in secure mode.
- ❷ The password is successfully cleared.

The **clear password** command is used to exit secure mode and return to user mode. To use **clear password**, you must know the current password. Once you clear the password, the console is no longer secure.

To clear the password without knowing the current password, you must use the **login** command in conjunction with the Halt button, as described in Section 2.6.3.

2.7 Updating Firmware

Typically, you update system firmware whenever the operating system is updated. You might also need to update firmware if you add I/O device controllers and adapters, if enhancements are made to the firmware, or if the serial ROM or RMC firmware become corrupted.

Sources of Firmware Updates

The system firmware resides in the flash ROM located on the system board. The Alpha Systems Firmware Update Kit comes on a CD-ROM, which is updated quarterly. You can also obtain Alpha firmware updates from the Internet.

Quarterly Update Service

The Alpha Systems Firmware Update Kit CD-ROM is available by subscription from hp.

Alpha Firmware Internet Access

You can also obtain Alpha firmware update files from the Internet:
<http://ftp.digital.com/pub/DEC/Alpha/firmware/>

If you do not have a Web browser, you can access files using anonymous ftp:

```
$ ftp ftp.digital.com
Name (ftp.digital.com:mcdowell): anonymous
331 Guest login ok, send ident as password.
Password:
230 Guest login ok, access restrictions apply.
Remote system type is UNIX.
Using binary mode to transfer files.
ftp> cd /pub/DEC/Alpha/firmware
ftp> ls
...
ftp> cd v6.4
ftp> ls
...
ftp> cd ds25
ftp> get README
```

The README file explains how to download firmware updates.

2.7.1 Firmware Update Utility

The system firmware is updated from a Loadable Firmware Update Utility (LFU). When you boot the medium containing the update image, the LFU banner and command descriptions are displayed. Enter commands at the UPD> prompt.

Before updating the firmware, enter the **list** command to list the current revision of the firmware. Enter the **update** command to update the firmware automatically.

Example 2-13 Update Utility Display

```
Checking dqa0.0.0.16.0 for the option firmware files. . .
Checking dva0.0.0.1000.0 for the option firmware files. . .
```

```
Option firmware files were not found on CD or floppy.
If you want to load the options firmware,
please enter the device on which the files are located(ewa0),
or just hit <return> to proceed with a standard console up-
date:
```

```
***** Loadable Firmware Update Utility *****
-----
Function      Description
-----
Display      Displays the system's configuration table.
Exit         Done exit LFU (reset).
List         Lists the device, revision, firmware name, and update
              revision
Update       Replaces current firmware with loadable data image.
Verify       Compares loadable and hardware images.
? or Help    Scrolls this function table.
-----
```

UPD> list

Device	Current Revision	Filename	Update Revision
FSB	V6.3-2	fsb_fw	V6.3-2
SRM	V6.3-1	srn_fw	V6.3-1
srom	V1.3-F	srom_fw	V1.3-F
		cipca_fw	A420
		dfxaa_fw	3.20
		fca_2354_fw	CS3.81A4
		kgpsa_8k_fw	DS3.81A4
		kzpcc_smor	1.12
		kzpcc_fw	CQ16
		kzpsa_fw	A12

UPD>

UPD> u srm

Confirm update on:

srm

[Y/(N)]y

WARNING: updates may take several minutes to complete for each device.

DO NOT ABORT!

srm Updating to 6.3-1... Verifying 6.3-1... PASSED.

UPD> u fsb

Confirm update on:

fsb

[Y/(N)]y

WARNING: updates may take several minutes to complete for each device.

DO NOT ABORT!

fsb Updating to 6.3-2... Verifying 6.3-2... PASSED.

UPD> list

.

.

.

UPD> exit

2.7.2 Manual Updates

If the RMC firmware or serial ROM (SROM) become corrupted, you can perform a manual update.

1. Boot the update medium.
2. At the UPD> prompt, enter the **exit** command and answer **y** at the prompt:

```
UPD> exit
```

```
Do you want to do a manual update [y/(n)] y
```

```
AlphaServer DS25 Console V6.3-1, built on May 2,2002 at  
05:02:30
```

3. To update RMC firmware, enter **update rmc**. To update the serial ROM (SROM), enter **update srom**. For example:

```
UPD> update rmc
```

or

```
UPD> update srom
```

NOTE: *The RMC will recycle and it will seem as if the system has reset. Only the RMC resets itself during the update. If the update is done through the serial line connected to COM1, and COM1_mode is set to **through**, RMC power-up messages will be seen during the update.*

Example 2-14 Update RMC Example

```
UPD> update rmc
```

```
Confirm update on:  
rmc [Y/(N)]y
```

```
WARNING: updates may take several minutes to complete for  
each device.
```

```
DO NOT ABORT!
```

```
rmc Updating to V1.1...  
RMC - Starting to Test Max Fan Speeds  
RMC - Power Supplies OK  
RMC - System DC is OK  
RMC - System is up  
RMC - System Fans OK  
RMC - Powerup Complete  
Verifying V1.1... PASSED.
```

```
UPD>
```

2.7.3 Updating from the CD-ROM

You can update the system firmware from CD-ROM.

1. At the SRM console prompt, enter the **show device** command to determine the drive name of the CD-ROM drive.
2. Load the Alpha Systems Firmware Update CD into the drive.
3. Boot the system from the CD, using the drive name determined in step 1 (for example, dqa0).

```
P00>>> boot dqa0
```

4. Enter the **update** command at the UPD> prompt.
5. When the update is complete, exit from the Firmware Update Utility.

```
UPD> exit
```

2.7.4 Updating from an OpenVMS System Disk

You can update the firmware from an OpenVMS system disk.

1. Download the firmware update image from the Firmware Updates Web site.
2. Rename the downloaded file to fwupdate.exe.
3. Enter the following commands on the *OpenVMS* Alpha system:

```
$ set file/attr=(rfm:fix,lrl:512,mrs:512,rat:none) fwup-  
date.exe  
$ copy/contiguous fwupdate.exe "system_disk":[sys0.sysexel]
```

NOTE: *Insert the name of your system disk in place of "system_disk," for example, dka100:.*

4. Shut down the operating system to get to the SRM console prompt.
5. Boot the update utility from the SRM console as follows:

```
P00>>> boot dka100 -flags 0,a0
```

NOTE: *Replace dka100 with the name of the system disk, if different.*

6. After some messages are displayed, you will be prompted for the bootfile. Enter the directory and file name as follows :

```
Bootfile: [sys0.sysexel]fwupdate.exe
```

7. Enter the **update** command at the UPD> prompt.

2.7.5 Updating from the Network

You can update firmware from the network using the MOP protocol for *OpenVMS* or the BOOTP protocol for *Tru64 UNIX*.

Updating Firmware Using BOOTP

1. Download the firmware update image from the Firmware Updates Web site.
2. Copy the downloaded file to a UNIX based network server for BOOTP booting on the system. For details on configuring the BOOTP server, refer to *Tru64 UNIX* documentation or the system's Firmware Release Notes document.
3. Enter the **update** command at the UPD> prompt.

Updating Firmware Using MOP

1. Download the firmware update image from the Firmware Updates Web site.
2. Copy the downloaded file to an *OpenVMS* based network server for MOP booting on the system. For details on configuring the MOP server, refer to *OpenVMS* documentation or the system's Firmware Release Notes document.
3. To ensure that the downloaded file is in a proper VMS fixed record format, enter the following command before using the file for MOP booting:

```
$ set file/attr=(rfm:fix,lrl:512,mrs:512,rat:none) "fwupdate.sys"
```

NOTE: Replace *"fwupdate.sys"* with the name of the firmware image you downloaded.

4. Boot the update file. For example:

```
P00>>> boot -file fwupdate eia0
```
5. Enter the **update** command at the UPD> prompt.

Chapter 3

Booting and Installing an Operating System

This chapter gives instructions for booting the *Tru64 UNIX*, *OpenVMS*, and *Linux* operating systems and for starting an operating system installation. It also describes how to switch from one operating system to another. Refer to your operating system documentation for complete instructions on booting or starting an installation.

The following topics are included:

- Setting Boot Options
- Booting *Tru64 UNIX*
- Starting a *Tru64 UNIX* Installation
- Booting Linux
- Booting *OpenVMS*
- Booting *OpenVMS* from the InfoServer
- Starting an *OpenVMS* Installation

NOTE: *Your system may have been delivered to you with factory-installed software (FIS); that is, with a version of the operating system already installed. If so, refer to the FIS documentation included with your system to boot your operating system for the first time. Linux-ready systems do not come with factory-installed software.*

3.1 Setting Boot Options

You can set a default boot device, boot flags, and network boot protocols for Tru64 UNIX or OpenVMS using the SRM **set** command with environment variables. Once these environment variables are set, the boot command defaults to the stored values. You can override the stored values for the current boot session by entering parameters on the boot command line.

The SRM boot-related environment variables are listed below and described in the following sections.

auto_action	Determines the default action the system takes when the system is power cycled, reset, or experiences a failure.
bootdef_dev	Device or device list from which booting is to be attempted when no path is specified on the command line.
boot_file	Specifies a default file name to be used for booting when no file name is specified by the boot command.
boot_osflags	Defines parameters (boot flags) used by the operating system to determine some aspects of a system bootstrap.
eg*0_inet_init ei*0_inet_init ew*0_inet_init	Determines whether the interface's internal Internet database is initialized from NVRAM or from a network server (through the bootp protocol). Set this environment variable if you are booting <i>Tru64 UNIX</i> from a RIS server.
eg*0_protocols ei*0_protocols ew*0_protocols	Defines a default network boot protocol (bootp or mop).

3.1.1 auto_action

The **auto_action** environment variable specifies the action the console takes any time the system powers up, fails, or resets. The value of **auto_action** takes effect only after you reset the system by pressing the Reset button or by issuing the **init** command.

The default setting for **auto_action** is **halt**. With this setting, the system stops in the SRM console after being initialized. To cause the operating system to boot automatically after initialization, set the **auto_action** environment variable to **boot** or **restart**.

- When **auto_action** is set to **boot**, the system boots from the default boot device specified by the value of the **bootdef_dev** environment variable.
- When **auto_action** is set to **restart**, the system boots from whatever device it booted from before the shutdown/reset or failure.

NOTE: *After you set the **auto_action** environment variable, it is recommended that you set the boot device and operating system flags as well, using the **set bootdef_dev** and **set boot_osflags** commands.*

The syntax is:

set auto_action *value*

The options for value are:

halt	The system remains in console mode after power-up or a system crash.
boot	The operating system boots automatically after the SRM init command is issued or the Reset button is pressed.
restart	The operating system boots automatically after the SRM init command is issued or the Reset button is pressed, and it also reboots after an operating system crash.

Examples

In the following example, the operator sets the **auto_action** environment variable to **restart**. The device specified with the **bootdef_dev** environment variable is **dka0**. When *Tru64 UNIX* is shut down and rebooted, the system will reboot from **dka0**.

```
P00>>> show auto_action
auto_action          halt
P00>>> set auto_action restart
P00>>> init
.
.
.
P00>>> show auto_action
auto_action          restart
P00>>> show bootdef_dev
bootdef_dev          dka0
P00>>> boot
...
[Log in to UNIX and shutdown/reboot]
#shutdown -r now
...
console will boot from dka0
```

In the following example, **auto_action** is set to **restart**, but *Tru64 UNIX* is booted from a device other than the device set with **bootdef_dev**. When *Tru64 UNIX* is shut down and rebooted, the system reboots from the specified device.

```
P00>>> boot dka100
.
.
.
[Log in to UNIX and shutdown/reboot]
#shutdown -r now
...
console will boot from dka100
```

3.1.2 bootdef_dev

The **bootdef_dev** environment variable specifies one or more devices from which to boot the operating system. When more than one device is specified, the system searches in the order listed and boots from the first device with operating system software.

Enter the **show bootdef_dev** command to display the current default boot device. Enter the **show device** command for a list of all devices in the system.

The syntax is:

set bootdef_dev *boot_device*

boot_device The name of the device on which the system software has been loaded. To specify more than one device, separate the names with commas.

Example

In this example, two boot devices are specified. The system will try booting from dkb0 and if unsuccessful, will boot from dka0.

```
P00>>> set bootdef_dev dkb0, dka0
```

NOTE: When you set the **bootdef_dev** environment variable, it is recommended that you set the operating system boot parameters as well, using the **set boot_osflags** command.

3.1.3 boot_file

The boot_file environment variable specifies the default file name to be used for booting when no file name is specified by the boot command. The factory default value is null.

The syntax is:

set boot_file *filename*

Example

In this example, the system is set to boot from dka0.

```
P00>>> set boot_file dka0
```

3.1.4 boot_osflags

The `boot_osflags` environment variable sets the default boot flags and, for OpenVMS, a root number.

Boot flags contain information used by the operating system to determine some aspects of a system bootstrap. Under normal circumstances, you can use the default boot flag settings.

To change the boot flags for the current boot only, use the *flags_value* argument with the **boot** command.

The syntax is:

set boot_osflags *flags_value*

The *flags_value* argument is specific to the operating system.

Tru64 UNIX Systems

Tru64 UNIX systems take a single ASCII character as the *flags_value* argument.

- a** Load operating system software from the specified boot device (autoboot). Boot to multiuser mode.
- i** Prompt for the name of a file to load and other options (boot interactively). Boot to single-user mode.
- s** Stop in single-user mode. Boots */vmunix* to single-user mode and stops at the # (root) prompt.
- D** Full dump; implies “s” as well. By default, if *Tru64 UNIX* crashes, it completes a partial memory dump. Specifying “**D**” forces a full dump at system crash.

Example

The following setting will autoboot *Tru64 UNIX* to multiuser mode when you enter the **boot** command.

```
P00>>> set boot_osflags a
```

Linux Systems

The *flags_value* argument for Linux is 0 (zero).

Flags_value Arguments for Red Hat Distribution

- 0 Halt. (Do not set init default to this value.)
- 1 Single-user mode.
- 2 Multiuser, without NFS (same as 3, if you do not have networking)
- 3 Full multiuser mode (Default)
- 4 Unused
- 5 X11
- 6 Reboot. (Do not set init default to this value.)

Flags_value Arguments for SuSE Distribution

- 0 Halt. (Do not set init default to this value.)
- S Single-user mode. (Default)
- 1 Multiuser without network
- 2 Multiuser with network
- 3 Multiuser with network and xdm
- 6 Reboot. (Do not set init default to this value.)

Single-user mode is typically used for troubleshooting. To make system changes at this run level, you must have read/write privileges. The command to boot Linux into single-user mode is similar to the following example, where “/” root is in partition 2 of dka0, and the kernel is in /boot/compaq.gz.

```
P00>>> boot -file 2/boot/compaq.gz -flags "root=/dev/sda2 rw s"
```

Example

This following command sets the **boot_osflags** environment variable for Linux:

```
P00>>> set boot_osflags 0
```

OpenVMS Systems

OpenVMS systems require an ordered pair as the *flags_value* argument: *root_number* and *boot_flags*.

root_number Directory number of the system disk on which *OpenVMS* files are located. For example:

<i>root_number</i>	Root Directory
--------------------	----------------

0 (default)	[SYS0.SYSEXE]
-------------	---------------

1	[SYS1.SYSEXE]
---	---------------

2	[SYS2.SYSEXE]
---	---------------

3	[SYS3.SYSEXE]
---	---------------

boot_flags The hexadecimal value of the bit number or numbers set. To specify multiple boot flags, add the flag values (logical OR). For example, the flag value 10080 executes both the 80 and 10000 flag settings. See Table 3–1.

Table 3–1 OpenVMS Boot Flag Settings

Flags_Value	Bit Number	Meaning
1	0	Bootstrap conversationally (enables you to modify SYSGEN parameters in SYSBOOT).
2	1	Map XDELTA to a running system.
4	2	Stop at initial system breakpoint.
8	3	Perform diagnostic bootstrap.
10	4	Stop at the bootstrap breakpoints.
20	5	Omit header from secondary bootstrap image.
80	7	Prompt for the name of the secondary bootstrap file.
100	8	Halt before secondary bootstrap.
10000	16	Display debug messages during booting.
20000	17	Display user messages during booting.

Examples

In the following *OpenVMS* example, *root_number* is set to 2 and *boot_flags* is set to 1. With this setting, the system will boot from root directory [SYS2.SYSEXE] to the SYSBOOT prompt when you enter the **boot** command.

```
P00>>> set boot_osflags 2,1
```

In the following *OpenVMS* example, *root_number* is set to 0 and *boot_flags* is set to 80. With this setting, you are prompted for the name of the secondary bootstrap file when you enter the **boot** command.

```
P00>>> set boot_osflags 0,80
```

3.1.5 ex*0_inet_init

The **eg*0_inet_init**, **ei*0_inet_init**, or **ew*0_inet_init** environment variable determines whether the interface's internal Internet database is initialized from nvram or from a network server (through the bootp protocol). Legal values are **nvram** and **bootp**. The default value is **bootp**. Set this environment variable if you are booting Tru64 UNIX from a RIS server.

To list the network devices on your system, enter the **show device** command. The Ethernet controllers start with the letters “eg”, “ei” or “ew,” for example, ewa0. The third letter is the adapter ID for the specific Ethernet controller. Replace the asterisk (*) with the adapter ID letter when using this command.

The syntax is:

```
set eg*0_inet_init value or
set ei*0_inet_init value or
set ew*0_inet_init value
```

The *value* is one of the following:

nvram	Initializes the internal Internet database from nvram.
bootp	Initializes the internal Internet database from a network server through the bootp protocol.

Example

```
P00>>> set ewa0_inet_init bootp
```

3.1.6 ex*_protocols

The eg*0_protocols, ei*0_protocols, or ew*0_protocols environment variable sets network protocols for booting and other functions.

To list the network devices on your system, enter the **show device** command. The Ethernet controllers start with the letters “eg,” “ei,” or “ew,” for example, ewa0. The third letter is the adapter ID for the specific Ethernet controller. Replace the asterisk (*) with the adapter ID letter when entering the command.

The syntax is:

set eg*0_protocols *protocol_value* or
set ei*0_protocols *protocol_value* or
set ew*0_protocols *protocol_value*

The options for *protocol_value* are:

- | | |
|----------------------|---|
| mop (default) | Sets the network protocol to mop (Maintenance Operations Protocol), the setting typically used with the <i>OpenVMS</i> operating system. |
| bootp | Sets the network protocol to bootp, the setting typically used with the <i>Tru64 UNIX</i> operating system. |
| bootp,mop | When both are listed, the system attempts to use the mop protocol first, regardless of which is listed first. If not successful, it then attempts the bootp protocol. |

Example

```
P00>>> show device

dqa0.0.0.16.0          DQA0          HL-DT-ST GCE-8302B 2.01
dva0.0.1000.0*         DVA0
ega0.0.0.5.2           EGA0          00-00-00-00-00-00
eia0.0.0.8.0           EIA0          40-00-04-A5-F8-00
pka0.7.0.1.2           PKA0          SCSI Bus ID 7
pkb0.7.0.101.2         PKB0          SCSI Bus ID 7

P00>>>
```

* DS25 systems have no floppy drive.

3.2 Booting Tru64 UNIX

Tru64 UNIX can be booted from a CD-ROM on a local drive (a CD-ROM drive connected to the system), from a local SCSI disk, or from a UNIX RIS server. Example 3-1 shows a boot from a local SCSI disk drive. The example is abbreviated. For complete instructions on booting Tru64 UNIX, see the *Tru64 UNIX Installation Guide*.

Example 3-1 Booting Tru64 UNIX from a Local SCSI Disk

```
P00>>> boot dka200
(boot dka200.2.0.1.2 -flags 0,0)
block 0 of dka200.2.0.1.2 is a valid boot block
reading 14 blocks from dka200.2.0.1.2
bootstrap code read in
base = 314000, image_start = 0, image_bytes = 1c00(7168)
initializing HWRPB at 2000
initializing page table at 5fff0000
initializing machine state
setting affinity to the primary CPU
jumping to bootstrap code

UNIX boot - Wednesday August 01, 2001

Loading vmunix ...
Loading at 0xfffffc0000430000

Sizes:
text = 4833472
data = 732176
bss = 1643280
Starting at 0xfffffc000043fe90

set_pmap_memdsc_state: start 0x0 end 0x161f c1 0xffffffffffffb6d90
Alpha boot: available memory from 0x2c3e000 to 0x5ffee000
Compaq Tru64 UNIX V5.1A (Rev. 1885); Wed Apr 24 15:56:13 EST 2002
physical memory = 1536.00 megabytes.
available memory = 1491.67 megabytes.
using 5854 buffers containing 45.73 megabytes of memory
Master cpu at slot 0
Starting secondary cpu 1
Firmware revision: 6.3-1
PALcode: UNIX version 1.90-31
HP AlphaServer DS25
.
.
.

Checking for Installation Tasks...

Executing Installation Tasks...
The system is coming up. Please wait...
Checking for crash dumps
Initializing paging space
```

```
Mounting Memory filesystems
evmstart: Daemon started
Jun  3 14:38:12 esmd: Started monitoring the EVM daemon
security configuration set to default (BASE).
File /etc/sia/matrix.conf updated successfully.
Successful SIA initialization

/usr/sbin/autopush: Can't push requested modules on STREAM for entry 36
/usr/sbin/autopush: Device (6,-1) already configured
.
.
.

LAT started.
Printer service started
SysMan authentication server (smauthd) started
SysMan Station server (smsd) started
The system is ready.

Compaq Tru64 UNIX V5.1A (Rev. 1885) (QA0005.mro.cpqcorp.net) console
login:
```

Perform the following tasks to boot a *Tru64 UNIX* system:

1. Power up the system. The system stops at the SRM console prompt, P00>>>.
2. Set boot environment variables, if desired. See Section 3.1.
3. Install the boot medium. For a network boot, see Section 3.2.1.
4. Enter the **show device** command to determine the unit number of the drive for your device.
5. Enter the **boot** command and command-line parameters (if you have not set the associated environment variables). In Example 3–1, boot flags have already been set.

3.2.1 Booting Tru64 UNIX over the Network

To boot your Tru64 UNIX system over the network, make sure the system is registered on a Remote Installation Services (RIS) server. See the Tru64 UNIX document entitled *Sharing Software on a Local Area Network* for registration information.

Example 3-2 RIS Boot

```
P00>>> show device ❶
dqa0.0.0.16.0          DQA0          HL-DT-ST GCE-8302B 2.01
dva0.0.0.1000.0*       DVA0
ega0.0.0.0.5.2         EGA0          00-00-00-00-00-00
eia0.0.0.0.8.0         EIA0          40-00-04-A5-F8-00
pka0.7.0.1.2          PKA0          SCSI Bus ID 7
pkb0.7.0.101.2        PKB0          SCSI Bus ID 7

P00>>>

P00>>> set ega0_protocols bootp ❷
P00>>> set ega0_inet_init bootp ❸
P00>>> boot ega0 Da ❹
.
```

* The floppy drive is not used on the DS25 system.

Systems running *Tru64 UNIX* support network adapters, designated eg*0, ew*0, or ei*0. The asterisk stands for the adapter ID (a, b, c, and so on).

1. Power up the system. The system stops at the SRM console prompt, P00>>>.
2. Set boot environment variables, if desired. See Section 3.1.
3. Enter the **show device** command ❶ to determine the unit number of the drive for your device.
4. Enter the following commands. Example 3–2 assumes you are booting from ewa0. If you are booting from another drive, enter that device name instead.

```
P00>>> set ega0_protocols bootp
P00>>> set ega0_inet_init bootp
```

The first command ❷ enables the bootp network protocol for booting over the Ethernet controller. The second command ❸ sets the internal Internet database to initialize from the network server through the bootp protocol.

5. Enter the **boot** command ❹ and command-line parameters (if you have not set the associated environment variables). In Example 3–2 the **boot** command sets the system to boot automatically from ega0.

For complete instructions on booting *Tru64 UNIX* over the network, see the *Tru64 UNIX Installation Guide*.

3.3 Starting a Tru64 UNIX Installation

Tru64 UNIX is installed from the CD-ROM drive connected to the system. The display that you see after you boot the CD depends on whether your system console is a VGA monitor or a serial terminal.

Example 3-3 Text-Based Installation Display

```
P00>>>b dqa0

(boot dqa0.0.0.16.0 -flags 0,0)
block 0 of dqa0.0.0.16.0 is a valid boot block
reading 15 blocks from dqa0.0.0.16.0
bootstrap code read in
base = 310000, image_start = 0, image_bytes = 1e00(7680)
initializing HWRPB at 2000
initializing page table at 5fff0000
initializing machine state
setting affinity to the primary CPU
jumping to bootstrap code

UNIX boot - Tuesday February 26, 2002

Loading vmunix ...
.
.

Initializing system for Tru64 UNIX installation. Please wait...
.
.

*** Performing CDRom Installation

Loading installation process and scanning system hardware.

Welcome to the Tru64 UNIX Installation Procedure
This procedure installs Tru64 UNIX onto your system. You will be asked a
series of system configuration questions. Until you answer all questions,
your system is not changed in any way.
During the question and answer session, you can go back to any
previous question and change your answer by entering: "history"
You can get more information about a question by entering: "help"
Refer to the "Installation Guide" and "Installation Guide - Advanced
Topics" for more detailed information about installing the operating
system.

The following options are available:
<Press RETURN for more>:

o The "U.S. English Installation" installs the base operating system
  software.

o The "Installation with Worldwide Language Support" (WLS) lets you
  internationalize your system. This option installs the base operating
  system software as well as WLS software. The additional software subsets
  provide support for various countries and their native languages.
```

- o The "Exit Installation" option stops the installation and puts your system in single-user mode with superuser privileges. This option is intended for experienced UNIX system administrators who want to perform file system or disk maintenance tasks before the installation. This option may also be used for disaster recovery on a previously installed system.

Remember, you can always get extra information by typing help.

- 1) U.S. English Installation
- 2) Installation with Worldwide Language Support
- 3) Exit Installation

Enter your choice:

1. Boot the operating system from the CD-ROM drive connected to the system.
2. Follow the *Tru64 UNIX* installation procedure that is displayed after the installation process is loaded.
 - If your system console is a VGA monitor, the X Server is started and an Installation Setup window is displayed. Click on the fields in the Installation Setup window to enter your responses to the installation procedure.
 - If your system console is a serial terminal, a text-based installation procedure is displayed, as shown in Example 3-3. Enter the choices appropriate for your system.

See the *Tru64 UNIX Installation Guide* for complete installation instructions.

3.4 Booting Linux

Obtain the Linux installation document and install Linux on the system. Then verify the firmware version, boot device, and boot parameters, and issue the boot command.

The procedure for installing Linux on an Alpha system is described in the Alpha Linux installation document for your Linux distribution. The installation document can be downloaded from the following Web site:

<http://www.compaq.com/alphaserver/linux>

You need V6.3 or higher of the SRM console to install Linux. If you have a lower version of the firmware, you will need to upgrade. For instructions and the latest firmware images, see the following URL.

<http://ftp.digital.com/pub/DEC/Alpha/firmware/>

Linux Boot Procedure

1. Power up the system to the SRM console and enter the **show version** command to verify the firmware version.

```
P00>> show version
version                V6.3 May 1 2002 08:36:11
P00>>
```

2. Enter the show device command to determine the unit number of the drive for your boot device, in this case dqa0.0.0.16.0.

```
P00>>> sh dev

dqa0.0.0.16.0          DQA0          HL-DT-ST GCE-8302B 2.01
dva0.0.1000.0*         DVA0
ega0.0.0.5.2           EGA0          00-00-00-00-00-00
eia0.0.0.8.0           EIA0          40-00-04-A5-F8-00
pka0.7.0.1.2           PKA0          SCSI Bus ID 7
pkb0.7.0.101.2         PKB0          SCSI Bus ID 7

P00>>>
```

* DS25 systems have no floppy drive.

3. After installing Linux, set **boot** environment variables to configure boot parameters for Red Hat, SuSE, or TurboLinux. This example shows settings for booting from the system hard drive (dka0).

```
P00>>> set bootdef_dev dka0
P00>>> set boot_file
P00>>> set boot_osflags 0
P00>>> show boot*
boot_dev          dka0.0.0.17.0
boot_file
boot_osflags      0
boot_reset        OFF
bootdef_dev
booted_dev
booted_file
booted_osflags
```

4. From SRM enter the **boot** command. The following example shows abbreviated **boot** output.

Example 3-4 Linux Boot Output

```
P00>>> b dka0 -fl 1
(boot dka0.0.0.1.2 -flags 1)
block 0 of dka0.0.0.1.2 is a valid boot block
reading 172 blocks from dka0.0.0.1.2
bootstrap code read in
base = 314000, image_start = 0, image_bytes = 15800(88064)
initializing HWRPB at 2000
initializing page table at 5fff0000
initializing machine state
setting affinity to the primary CPU
jumping to bootstrap code
aboot: Linux/Alpha SRM bootloader version 0.9a
aboot: switching to OSF/1 PALcode version 1.90
aboot: booting from device 'SCSI 2 1 0 0 0 0 0'
aboot: valid disklabel found: 3 partitions.
aboot: loading uncompressed vmlinuz-2.4.9-32...
aboot: loading compressed vmlinuz-2.4.9-32...
aboot: zero-filling 498376 bytes at 0xfffffc0000b4e1b8
aboot: loading initrd (709138 bytes/692 blocks) at 0xfffffc005fe0e000
aboot: starting kernel vmlinuz-2.4.9-32 with arguments root=/dev/sda2 console=0
Linux version 2.4.9-32 (bhcompile@george.devel.redhat.com) (gcc version 2.96 202
Booting GENERIC on Titan variation Granite using machine vector PRIVATEER from M
Command line: root=/dev/sda2 console=ttyS0
memcluster 0, usage 1, start 0, end 394
memcluster 1, usage 0, start 394, end 196599
memcluster 2, usage 1, start 196599, end 196608
freeing pages 394:1024
freeing pages 1510:196599
reserving pages 1510:1513
Initial ramdisk at: 0xfffffc005fe0e000 (709138 bytes)
On node 0 totalpages: 196599
zone(0): 196599 pages.
zone(1): 0 pages.
zone(2): 0 pages.
```

```

Kernel command line: root=/dev/sda2 console=ttyS0
Using epoch = 1952
Console: colour dummy device 80x25
Calibrating delay loop... 1993.00 BogoMIPS
Memory: 1530600k/1572792k available (2076k kernel code, 34944k reserved, 792k d)
Dentry-cache hash table entries: 262144 (order: 9, 4194304 bytes)
Inode-cache hash table entries: 131072 (order: 8, 2097152 bytes)
Mount-cache hash table entries: 32768 (order: 6, 524288 bytes)
Buffer-cache hash table entries: 131072 (order: 7, 1048576 bytes)
Page-cache hash table entries: 262144 (order: 9, 4194304 bytes)
POSIX conformance testing by UNIFIX
isapnp: Scanning for PnP cards...
isapnp: No Plug & Play device found
Linux NET4.0 for Linux 2.4
Based upon Swansea University Computer Society NET3.039
Initializing RT netlink socket
Starting kswapd v1.8
VFS: Diskquotas version dquot_6.5.0 initialized
pty: 2048 Unix98 ptys configured
Serial driver version 5.05c (2001-07-08) with MANY_PORTS SHARE_IRQ SERIAL_PCI Id
ttyS00 at 0x03f8 (irq = 4) is a 16550A
ttyS01 at 0x02f8 (irq = 3) is a 16550A
block: queued sectors max/low 1012453kB/881381kB, 3008 slots per queue
RAMDISK driver initialized: 16 RAM disks of 8192K size 1024 blocksize
Uniform Multi-Platform E-IDE driver Revision: 6.31
ide: Assuming 33MHz PCI bus speed for PIO modes; override with idebus=xx
ALI15X3: IDE controller on PCI bus 00 dev 80
ALI15X3: chipset revision 193
ALI15X3: not 100% native mode: will probe irqs later
    ide0: BM-DMA at 0x10050-0x10057, BIOS settings: hda:pio, hdb:pio
    ide1: BM-DMA at 0x10058-0x1005f, BIOS settings: hdc:pio, hdd:pio
hda: HL-DT-ST GCE-8320B, ATAPI CD/DVD-ROM drive
ide: Assuming 33MHz PCI bus speed for PIO modes; override with idebus=xx
ide0 at 0x1f0-0x1f7,0x3f6 on irq 14
Floppy drive(s): fd0 is 2.88M
FDC 0 is a post-1991 82077
SCSI subsystem driver Revision: 1.00
md: md driver 0.90.0 MAX_MD_DEVS=256, MD_SB_DISKS=27
md: Autodetecting RAID arrays.
md: autorun ...
md: ... autorun DONE.
NET4: Linux TCP/IP 1.0 for NET4.0
IP Protocols: ICMP, UDP, TCP, IGMP
IP: routing cache hash table of 16384 buckets, 256Kbytes
TCP: Hash tables configured (established 524288 bind 65536)
Linux IP multicast router 0.06 plus PIM-SM
NET4: Unix domain sockets 1.0/SMP for Linux NET4.0.
RAMDISK: Compressed image found at block 0
Freeing initrd memory: 692k freed
VFS: Mounted root (ext2 filesystem).
Red Hat nash version 3.2.6 startscsi0 : Adaptec AIC7XXX EISA/VLB/PCI SCSI HBA D7
    <Adaptec aic7899 Ultra160 SCSI adapter>
    aic7899: Ultra160 Wide Channel A, SCSI Id=7, 32/253 SCBs

ing
Loading sd_scsi1 : Adaptec AIC7XXX EISA/VLB/PCI SCSI HBA DRIVER, Rev 6.2.7
    <Adaptec aic7899 Ultra160 SCSI adapter>
    aic7899: Ultra160 Wide Channel B, SCSI Id=7, 32/253 SCBs

mod module
Loading aic7xxx module
Vendor: COMPAQ Model: BF01863644 Rev: 3B05
Type: Direct-Access ANSI SCSI revision: 02

```

```
Vendor: COMPAQ      Model: BF01863644      Rev: 3B05
Type:   Direct-Access      ANSI SCSI revision: 02
scsi0:A:0:0: Tagged Queuing enabled.  Depth 253
scsi0:A:1:0: Tagged Queuing enabled.  Depth 253
Attached scsi disk sda at scsi0, channel 0, id 0, lun 0
Attached scsi disk sdb at scsi0, channel 0, id 1, lun 0
(scsi0:A:0): 160.000MB/s transfers (80.000MHz DT, offset 63, 16bit)
SCSI device sda: 35565080 512-byte hdwr sectors (18209 MB)
Partition check:
sda: sda1 sda2 sda3
(scsi0:A:1): 160.000MB/s transfers (80.000MHz DT, offset 63, 16bit)
SCSI device sdb: 35565080 512-byte hdwr sectors (18209 MB)
sdb: unknown partition table
Loading jbd moduJournalled Block Device driver loaded
le
Loading ext3 module

Red Hat Linux release 7.2 (Enigma)
Kernel 2.4.9-32 on an alpha

localhost.localdomain login:
```

NOTE: *The Linux banner is slightly different for the SuSE and TurboLinux distributions.*

3.5 Booting OpenVMS

OpenVMS can be booted from a CD-ROM on a local drive (the CD-ROM drive connected to the system) or from a CD-ROM drive on the InfoServer.

Example 3-5 Booting OpenVMS from the Local CD-ROM Drive

```
P00>>> show device ❶  
dqa0.0.0.16.0          DQA0          HL-DT-ST GCE-8302B 2.01  
dva0.0.1000.0*         DVA0  
ega0.0.0.5.2           EGA0          00-00-00-00-00-00  
eia0.0.0.8.0           EIA0          40-00-04-A5-F8-00  
pka0.7.0.1.2           PKA0          SCSI Bus ID 7  
pkb0.7.0.101.2         PKB0          SCSI Bus ID 7
```

```
P00>>>
```

```
.  
.   
.
```

```
P00>>> boot -flags 0,0 dqa0 ❷  
(boot dka0.0.0.7.1 -flags 0,0)  
block 0 of dka0.0.0.7.1 is a valid boot block  
reading 898 blocks from dka0.0.0.7.1  
bootstrap code read in  
base = 200000, image_start = 0, image_bytes = 70400  
initializing HWRPB at 2000  
initializing page table at 3ffee000  
initializing machine state  
setting affinity to the primary CPU  
jumping to bootstrap code
```

```
OpenVMS (TM) Alpha Operating System, Version V7.2-1
```

* DS25 systems have no floppy drive.

Example 3–5 shows a boot from a CD-ROM on a local drive. The example is abbreviated. For complete instructions on booting *OpenVMS*, see the *OpenVMS* installation document.

1. Power up the system. The system stops at the SRM console prompt, P00>>>.
2. Set boot environment variables, if desired. See Section 3.1.
3. Install the boot medium. For a network boot, see Section 3.6.
4. Enter the **show device** command ❶ to determine the unit number of the drive for your device.
5. Enter the **boot** command and command-line parameters (if you have not set the associated environment variables.) In Example 3–5, the **boot** command with the **-flags** option ❷ causes the system to boot from [SYS0.EXE] on device dka0.

3.6 Booting OpenVMS from the InfoServer

You can boot OpenVMS from InfoServer with a LAN device. The devices are designated eg*0, ew*0, or ei*0. The asterisk stands for the adapter ID (a, b, c, and so on).

Example 3-6 InfoServer Boot

```
P00>>> show device ❶  
dqa0.0.0.16.0          DQA0          HL-DT-ST GCE-8302B 2.01  
dva0.0.1000.0*         DVA0  
ega0.0.0.5.2           EGA0          00-00-00-00-00-00  
eia0.0.0.8.0           EIA0          40-00-04-A5-F8-00  
pka0.7.0.1.2           PKA0          SCSI Bus ID 7  
pkb0.7.0.101.2         PKB0          SCSI Bus ID 7
```

```
P00>>>
```

```
.  
. .  
.
```

```
P00>>> boot -flags 0,0 -file apb_0721 ega0 ❷  
(boot ewa0.0.0.9.0 -file APB_0721 -flags 0,0)  
Trying MOP boot.
```

```
.....  
Network load complete.  
Host name: CALSUN  
Host address: aa-00-04-00-a4-4e  
bootstrap code read in  
base = 200000, image_start = 0, image_bytes = 70400  
initializing HWRPB at 2000  
initializing page table at 3ffee000  
initializing machine state  
setting affinity to the primary CPU  
jumping to bootstrap code
```

* DS25 systems have no floppy drive.

Network Initial System Load Function
Version 1.2

③

```
FUNCTION          FUNCTION
ID
1      -          Display Menu
2      -          Help
3      -          Choose Service
4      -          Select Options
5      -          Stop
Enter a function ID value:
```

Enter a function ID Value: 3

④

```
OPTION          OPTION
ID
1      -          Find Services
2      -          Enter known Service Name
```

Enter an Option ID value: 2

Enter a Known Service Name: ALPHA_V73-1_SSB

OpenVMS (TM) Alpha Operating System, Version V7.3-1

1. Power up the system. The system stops at the P00>>> console prompt.
2. Insert the operating system CD-ROM into the CD-ROM drive connected to the InfoServer.
3. Enter the **show device** command ❶ to determine the unit number of the drive for your device.
4. Enter the **boot** command and any command-line parameters ❷. In Example 3-6 the device is EGA0. APB_0731 is the file name of the APB program used for the initial system load (ISL) boot program.

The InfoServer ISL program displays a menu ❸.

5. Respond to the menu prompts ❹, using the selections shown in this example.

For complete instructions on booting *OpenVMS* from the InfoServer, see the *OpenVMS* installation document.

3.7 Starting an OpenVMS Installation

After you boot the operating system CD-ROM, an installation menu is displayed on the screen. Choose item 1 (Install or upgrade OpenVMS Alpha). Refer to the OpenVMS installation document for information on creating the system disk.

Example 3-7 OpenVMS Installation Menu

```
OpenVMS (TM) Alpha Operating System, Version V7.3-1

%SMP-I-SECMSG, CPU #01 message:  P01>>>START
%SMP-I-CPUTRN, CPU #01 has joined the active set.
Please enter date and time (DD-MMM-YYYY HH:MM) 10-JUN-2002 14:00
$! Copyright 2002 Compaq Computer Corporation.

Installing required known files...

Configuring devices...
%EIA0, Auto-negotiation mode set by console
%EIA0, FastFD (Full Duplex 100BaseTX) connection selected

*****

You can install or upgrade the OpenVMS Alpha operating system
or you can install or upgrade layered products that are included
on the OpenVMS Alpha operating system CD-ROM.

You can also execute DCL commands and procedures to perform
"standalone" tasks, such as backing up the system disk.

Please choose one of the following:

    1) Upgrade, install or reconfigure OpenVMS Alpha Version V7.3-1
    2) Display products and patches that this procedure can install
    3) Install or upgrade layered products and patches
    4) Show installed products
    5) Reconfigure installed products
    6) Remove installed products
    7) Execute DCL commands and procedures
    8) Shut down this system

Enter CHOICE or ? for help: (1/2/3/4/5/6/7/8/?)
```

1. Boot the *OpenVMS* operating system CD-ROM.
2. Choose option 1 (Install or upgrade OpenVMS Alpha). To create the system disk, see the *OpenVMS* installation document.

Chapter 4

Configuring and Installing Components

This chapter shows how to configure and install user-replaceable components, including DIMMs, PCI options, power supplies, disk drives, and tape drives. It also covers configuring CPUs, installing the storage cage, configuration utilities, and updating firmware. Installation of components not covered in this chapter is reserved for service providers and customers who have purchased a self-maintenance contract.



WARNING: To prevent injury, access to internal components is limited to persons who have appropriate technical training and experience. Such persons are expected to understand the hazards of working within this equipment and take measures to minimize danger to themselves or others. These measures include:

1. Remove any jewelry that may conduct electricity.
 2. If accessing the system card cage, power down the system and wait 2 minutes to allow components to cool.
 3. Wear an antistatic wrist strap when handling internal components.
-



WARNING: To prevent injury, unplug the power cord before installing components.

Installation Tools

You need the following tools to install components.

- Phillips #2 screwdriver (a magnetic screwdriver is recommended)
- Antistatic wrist strap

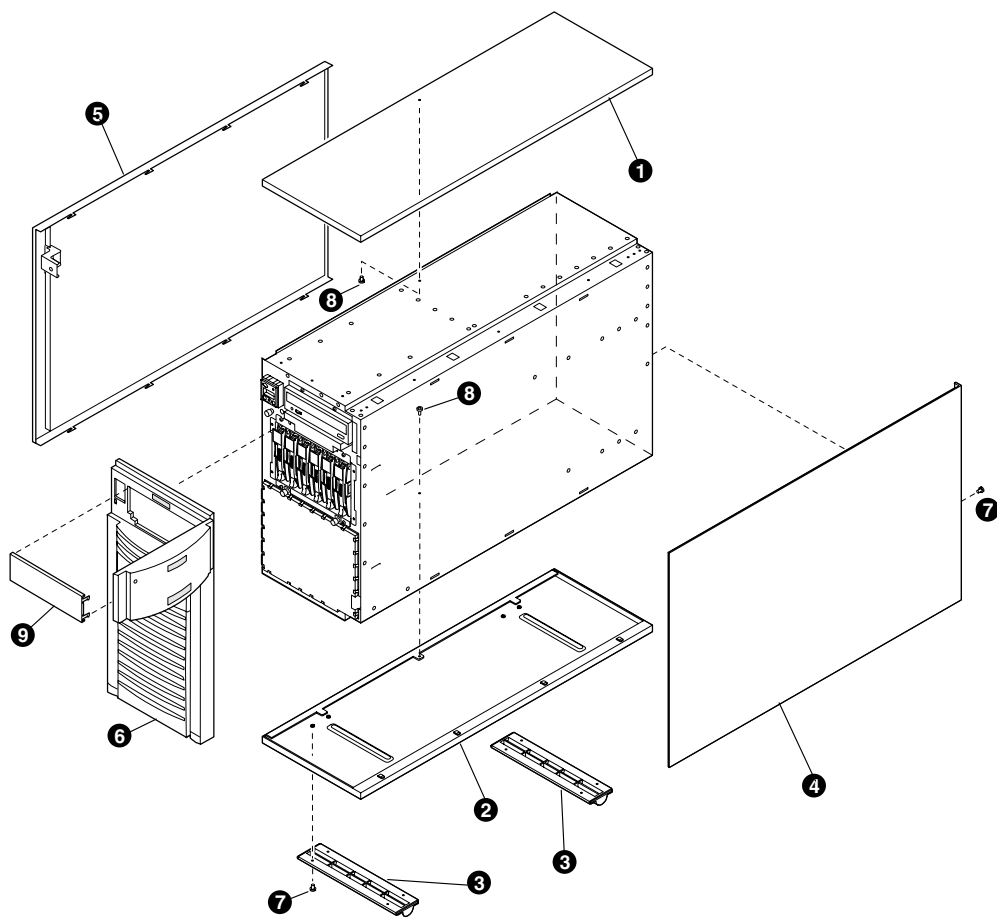
4.1 Installing a Pedestal Kit

This section is for customers who ordered a pedestal kit. The pedestal kit is used to convert a rackmount system to a pedestal.

CAUTION: *The system is very heavy. Two people are needed to lift and maneuver it.*

NOTE: *Before you begin the conversion procedure, shut down the operating system, turn off power to the system, and unplug the power cord. Review Figure 4-1 and Table 4-1 to verify the contents of the pedestal kit.*

Figure 4-1 Pedestal Kit Contents

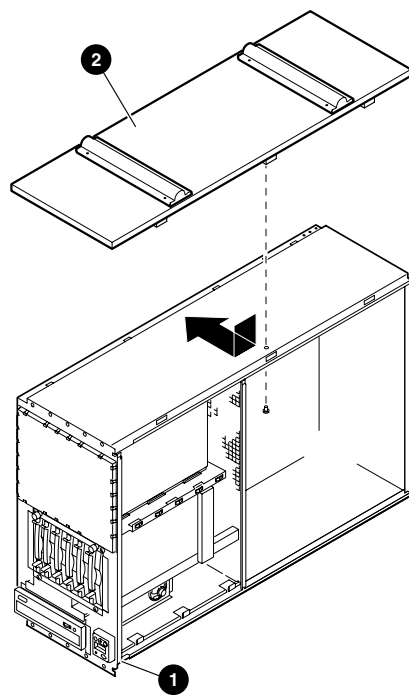


MR0298A

Table 4-1 Pedestal Kit Contents

	Hardware	Part Number	Quantity
❶	Upper panel	74-60248-01	1
❷	Lower panel	74-60248-02	1
❸	Slide feet	74-51716-01	2 (may already be installed on ❷)
❹	Side dress panel	74-60250-01	1
❺	Side access cover (painted)	74-60247-02	1
❻	Front door assembly	70-40254-01	1
❼	Screws, M3x6mm	90-09984-20	9 (for attaching slide feet. If slide feet are attached, only 1 screw loose piece.)
❽	Thumbscrews	74-60270-02	2
❾	Door	74-60337-01	1

Figure 4-2 Installing the Lower Panel

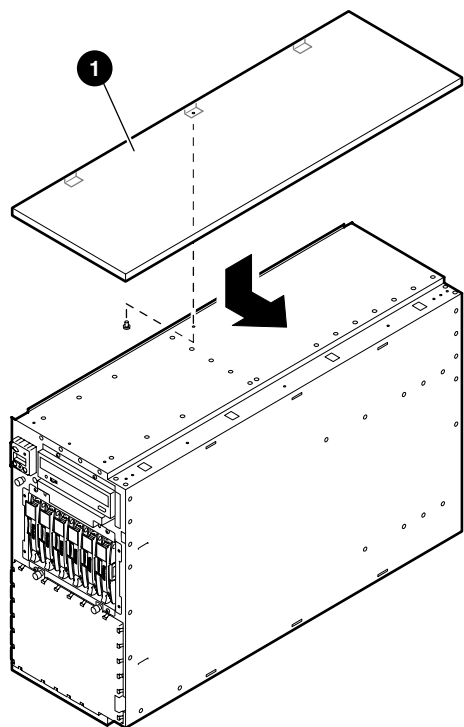


Conversion Procedure

1. Remove the top cover from the rack system by loosening the captive screw and sliding the cover to the rear. Set aside the cover; it will not be reused.
2. Rotate the system chassis so that the operator control panel (OCP) ❶ is at the lower right.
3. Place the lower panel slide feet up ❷, with the large tabs to the right as you face the front of the unit. Slide the panel to the left and seat it firmly. Insert a thumbscrew through the tab into the insert and tighten. See Figure 4-2.
4. Turn the chassis over and rest it on the slide feet. The OCP should now be at the upper left as you face the chassis.

5. Place the upper panel with the painted surface up and the large tabs to the left on the top of the unit. Slide the panel to the right. Insert a thumbscrew into the tab on the panel and insert it in the box and tighten. See Figure 4–3.

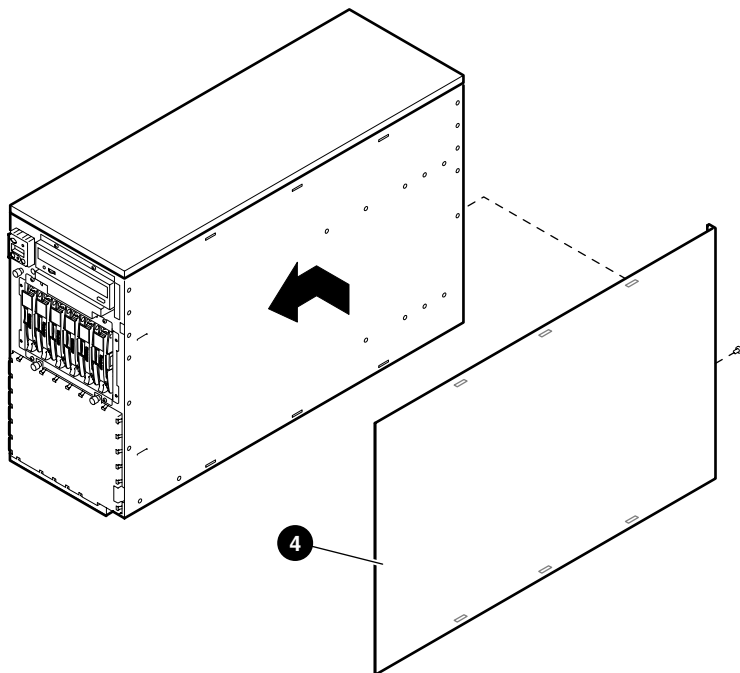
Figure 4–3 Installing the Upper Panel



MR0300A

6. Place the right side dress panel on the right side of the unit and engage the tabs in the slots. Push the panel toward the front of the unit. Insert one M3x6mm screw in the hole on the rear of the panel and tighten. See Figure 4-4.

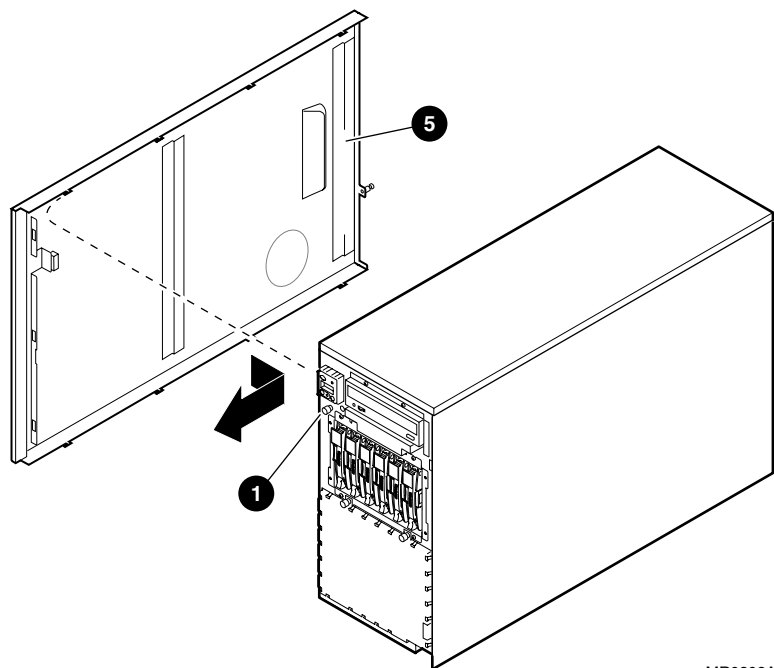
Figure 4-4 Installing the Side Dress Panel



MR0301A

7. Install the side access cover by inserting the cover tabs (4 top, 4 bottom) into the slots in the chassis. Slide the cover forward and secure it with the captive screw ❶. See Figure 4-5.

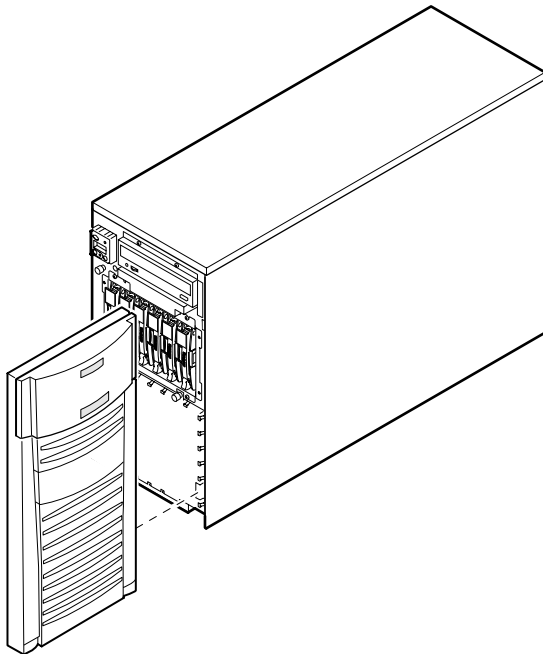
Figure 4-5 Installing the Side Access Cover



MR0302A

8. Hold the door so that the hinge is to the right as you face the front of the unit. Rotate the door until it is at a 90-degree angle with the right edge of the unit. Insert the door hinge pins into the mating holes recessed on the right edge of the unit and push down slightly. Close the door.

Figure 4-6 Installing the Door



MR0303A

4.2 Preparing to Install Components

To prepare your system for installation or replacement of components, assemble the required equipment, perform shutdown procedures, and attach an antistatic wrist strap.

Who should install components?

Refer to the following table to determine who should install or replace components. Components in the "Customer" column can be added or replaced by customers with appropriate technical training and experience. Components in the "Service Provider" column can be replaced only by authorized service providers or customers with a self-maintenance contract.

Customer	Service Provider
DIMMs	System board
CPU upgrades	Fans
PCI options	CD-ROM r/w drive
Power supply	Operator control panel
Disk drive cages	

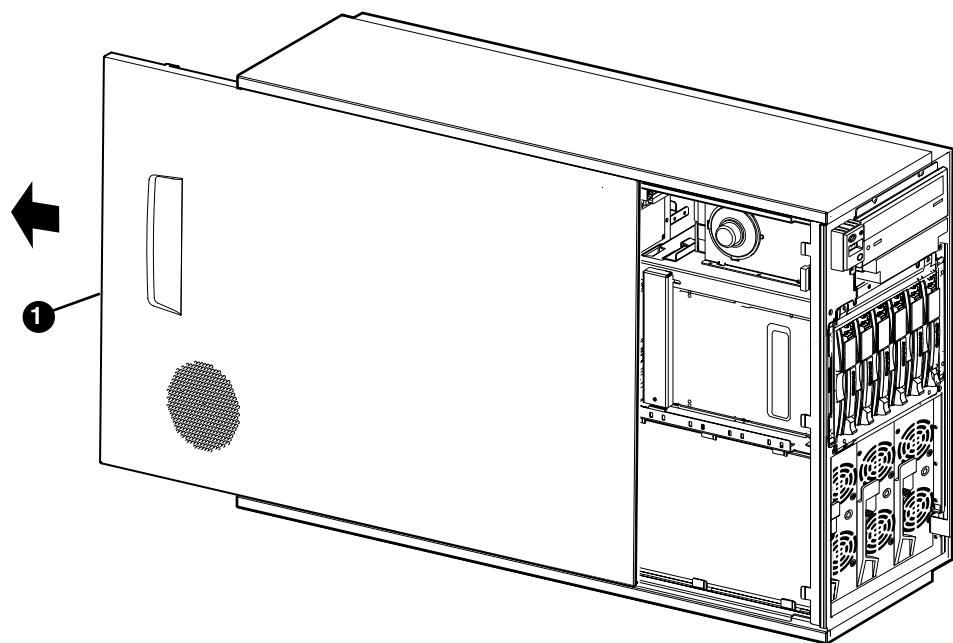
Before installing components:

1. Shut down the operating system, according to the instructions in the operating system documentation.
 2. Shut down peripheral devices.
 3. Press the Power button on the system unit to the Off position.
 4. Unplug the power cord.
 5. Remove the side cover (pedestal) or top cover (rackmount).
 6. Attach an antistatic wrist strap.
-

NOTE: *It is not necessary to shut down the system if you are installing a third power supply for redundancy or if you are replacing a faulty supply in a three-supply configuration.*

4.3 Removing the Side Cover (Pedestal)

Figure 4-7 Removing the Side Cover

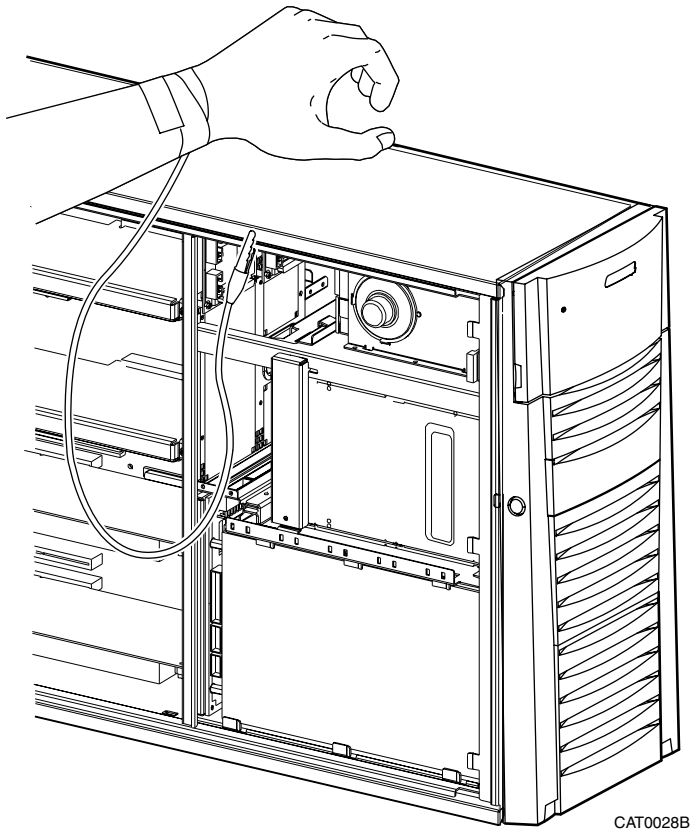


MR0415

1. Open the front door.
2. Loosen the thumbscrew ❶ that secures the side cover to the chassis.
3. Slide the cover rearward and remove it.

4. Attach an antistatic wrist strap as shown in Figure 4–8.

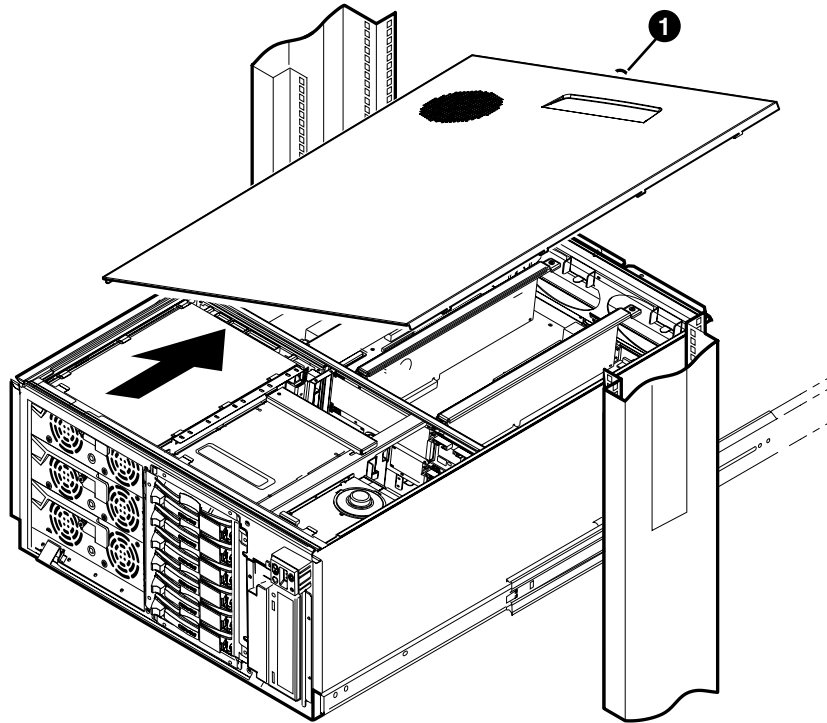
Figure 4–8 Attaching the Antistatic Wrist Strap



CAT0028B

4.4 Removing the Top Cover (Rackmount)

Figure 4-9 Removing Top Cover



CAT0033a

To remove the top cover:

1. Remove the bezel.
2. Loosen the thumbscrew ❶ that secures the cover to the chassis.
3. Slide the cover rearward and remove it.
4. Attach an antistatic wrist strap as shown in Figure 4-8.

4.5 Memory Configuration

The system supports a total of 16 DIMMs, divided into four arrays of four slots each. DIMMs within an array must be of the same size and speed. The system supports a maximum of 16 GB of memory. The minimum memory configuration is 512 MB.

Memory Performance Considerations

Interleaved operations reduce the average latency and increase the memory throughput over non-interleaved operations. With one memory option (4 DIMMs) installed, memory interleaving will not occur. With two identical memory options (8 DIMMs) installed, memory read-write operations are two-way interleaved. With a minimum of four identical memory options (16 DIMMs) installed, memory read-write operations are four-way interleaved, maximizing memory throughput.

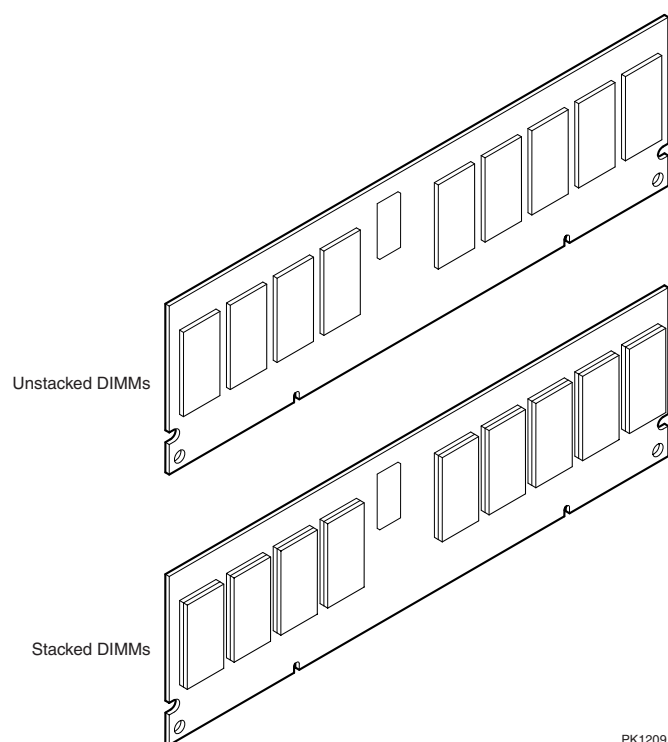
The output of the **show memory** command provides the memory interleaving status of the system.

```
P00>>> show memory
  Array      Size      Base Address      Intlv Mode
  -----
    0         4096Mb    0000000000000000      2-Way
    1         1024Mb    0000000200000000      2-Way
    2         4096Mb    0000000100000000      2-Way
    3         1024Mb    0000000240000000      2-Way
```

10240 MB of System Memory

You can mix stacked and unstacked DIMMs within the system, but not within an array. The DIMMs within an array must be of the same capacity and type (stacked or unstacked) because of different memory addressing.

Figure 4-10 Stacked and Unstacked DIMMs



PK1209

Memory Configuration Rules

- You can install up to 16 DIMMs.
- A maximum of 16 GB of memory is supported. If your system is model Dx-57AAA-xx and contains model FR-H7910-AA power supplies, three supplies are required to support memory greater than 8GB.
- There are four memory arrays, numbered 0–3, with four slots per array.
- A memory array must be populated with four DIMMs of the same size and speed. (See the table above for supported sizes and capacity.)
- Memory arrays must be populated in numerical order, starting with array 0.

Figure 4-11 Memory Slots

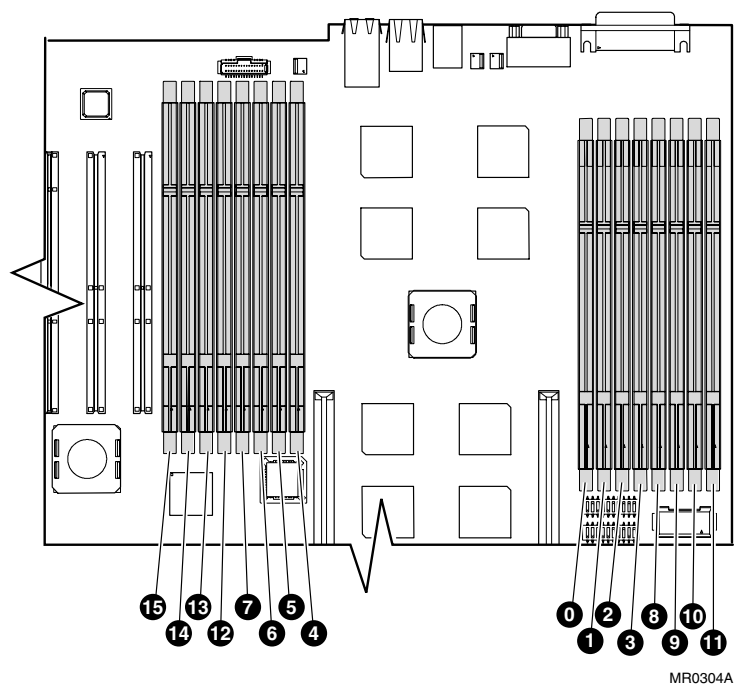


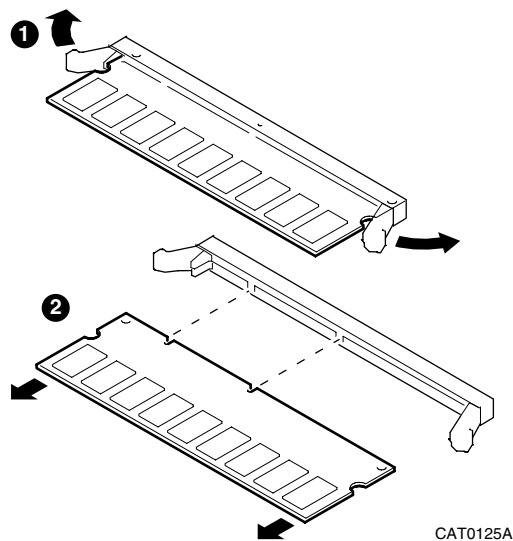
Table 4-2 DIMM and Array Reference

DIMM	Connector	Array	DIMM	Connector	Array
0	J15	0	1	J14	0
2	J12	2	3	J10	2
4	J45	0	5	J47	0
6	J48	2	7	J50	2
8	J9	1	9	J6	1
10	J3	3	11	J1	3
12	J51	1	13	J53	1
14	J55	3	15	J56	3

4.5.1 Installing and Removing DIMMs

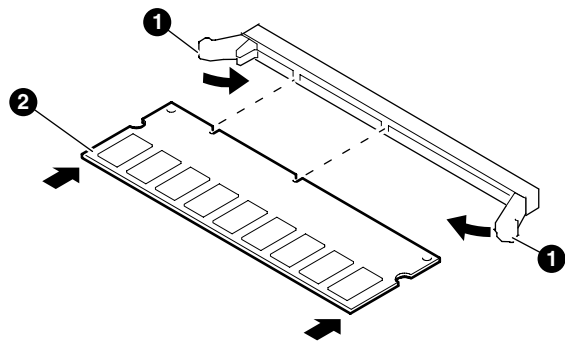
Before installing DIMMs, shut down the operating system, turn off power to the system, and unplug the power cord. Remove the side cover (pedestal) or top cover (rackmount) and attach an antistatic wrist strap.

Figure 4-12 Removing DIMMs



1. Shut down the operating system and turn off power to the system. Unplug the power cord from each power supply.
2. Use Table 4-2 and the memory configuration rules for determining where sets of memory DIMMs should be installed.
3. Release the clips ❶ securing the appropriate DIMM ❷ and slide out the DIMM. See Figure 4-12.

Figure 4-13 Installing DIMMs



CAT0124A

1. To install the DIMM ②, align the notches on the gold fingers with the connector keys as shown in Figure 4-13.
2. Shut down the operating system and turn off power to the system. Unplug the power cord from each power supply.
3. Use Table 4-2 and the Memory Configuration Rules for determining where sets of memory DIMMs should be installed.
4. To install the DIMM ②, align the notches on the gold fingers with the connector keys as shown in Figure 4-13.
5. Secure the DIMM with the clips ① on the DIMM slot.

Verification

1. Turn on power to the system.
2. At the SRM prompt, issue the **show memory** command to display the amount of memory in each array and the total amount of memory in the system.

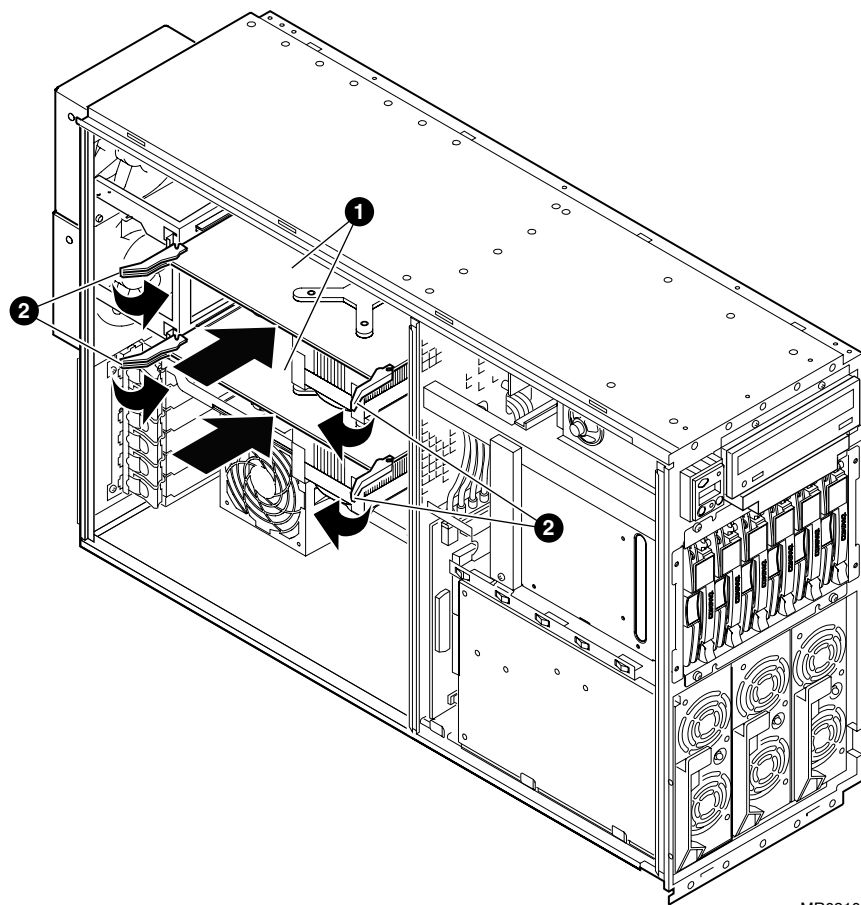
4.6 CPU Configuration

If your system came with one 1 GHz Alpha processor installed, you can upgrade by installing a second Alpha processor.

Processor Upgrade Guidelines

- In a single processor configuration, the CPU must be installed in the CPU slot 0 socket.
- A single processor configuration does not require termination in the empty socket.
- Dual processors must be the same speed and same cache size.

Figure 4-14 CPU Installation



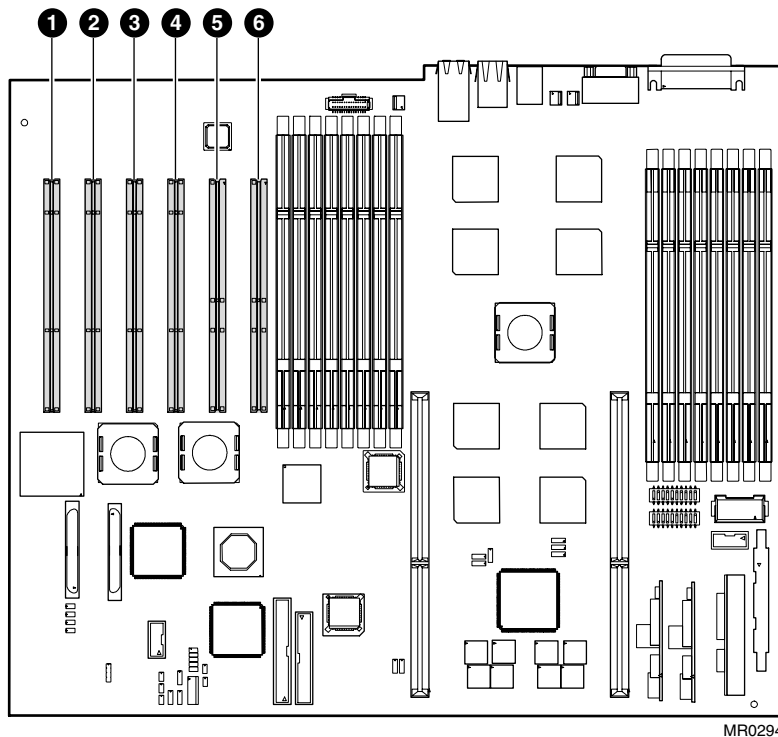
MR0310A

1. Push the CPU module **1** into the slot until the gold fingers meet the system motherboard CPU connector.
2. Push the clips **2** inward and down until the clips are horizontal and a complete connection is made.

4.7 Installing a PCI Option

PCI slot 1 is the leftmost slot in a rackmounted system or the bottom-most slot in a pedestal system. In systems with part numbers Dx-57AAA-xx, slot 6 supports a half-length card only. In systems with part numbers Dx-57AAB-xx, slot 6 supports full-length cards. Slots 1 through 5 support full-length cards.

Figure 4-15 PCI Slots



When installing PCI option modules, you do not normally need to perform any configuration procedures. The system configures PCI modules automatically. But because some PCI option modules require configuration utility CDs, refer to the option documentation.

4.7.1 PCI Configuration

PCI modules are either designed for 5.0 volts or 3.3 volts, or are universal in design and can plug into either 3.3 or 5.0 volt slots.

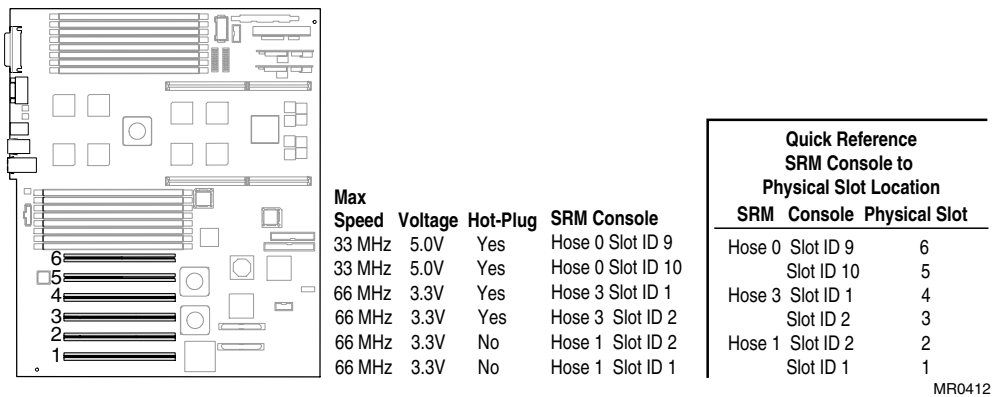
PCI slots are split across three independent 64-bit PCI buses, two buses at 66 MHz and one bus at 33 MHz. These buses correspond to Hose 0, 1, and 3 in the system logical configuration. The slots on each bus are listed below.

Some PCI options require drivers to be installed and configured. These options come with a CD-ROM. Refer to the installation document that came with the option and follow the manufacturer's instructions.

There is no direct correspondence between the physical numbers of the slots on the backplane and the logical slot identification reported with the SRM console **show config** command (described in Chapter 2). The table in Figure 4–16 maps the physical slot numbers to the SRM logical ID numbers for the I/O connectors.

CAUTION: *Check the keying before you install the PCI module and do not force it in. Plugging a module into a wrong slot can damage it.*

Figure 4-16 PCI Slot Voltages and Hose Numbers



4.7.2 Installing a PCI Option

Some PCI options require drivers to be installed and configured. These options come with a CD-ROM. Refer to the installation document that came with the option and follow the manufacturer's instructions.



WARNING: To prevent injury, access is limited to persons who have appropriate technical training and experience. Such persons are expected to understand the hazards of working within this equipment and take measures to minimize danger to themselves or others.



WARNING: To prevent fire, use only modules with current limited outputs. See National Electrical Code NFPA 70 or Safety of Information Technology Equipment, Including Electrical Business Equipment EN 60 950.



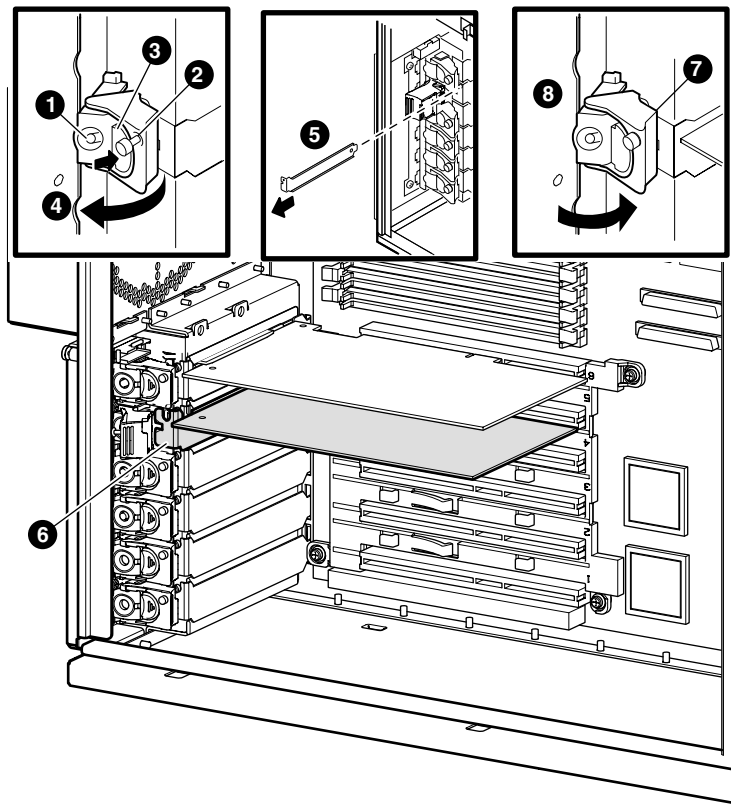
=== V @ >240VA

WARNING: High current area. Currents exceeding 240 VA can cause burns or eye injury. Avoid contact with components.



WARNING: The I/O area houses parts that operate at high temperatures. To prevent injury, avoid contact with components.

Figure 4-17 Installing a PCI Option



MR0394

CAUTION: *Hot plug is not currently supported by the operating systems. Do not press switches ❶ or ❸ on the hot-swap board. Pressing these switches can result in the loss of data.*

Complete the following procedure to add or remove a PCI option module.

1. Turn off the system power.
2. Unscrew captive screw ❷.
3. Press in latch button ❸ and open the latch ❹.
4. When replacing a PCI module, remove the bad module by pulling straight out.
5. When adding a PCI option module into an unused slot, remove the blank bulkhead ❺.
6. Install the new PCI option module ❻.
7. Screw in captive screw ❼.
8. Close latch ❸.

Close all latches before powering up the system. If the latch is open on either slot 3 (Hose 3/Slot ID 2) or slot 4 (Hose 3/Slot ID 1), both slots will run at 33 Mhz.

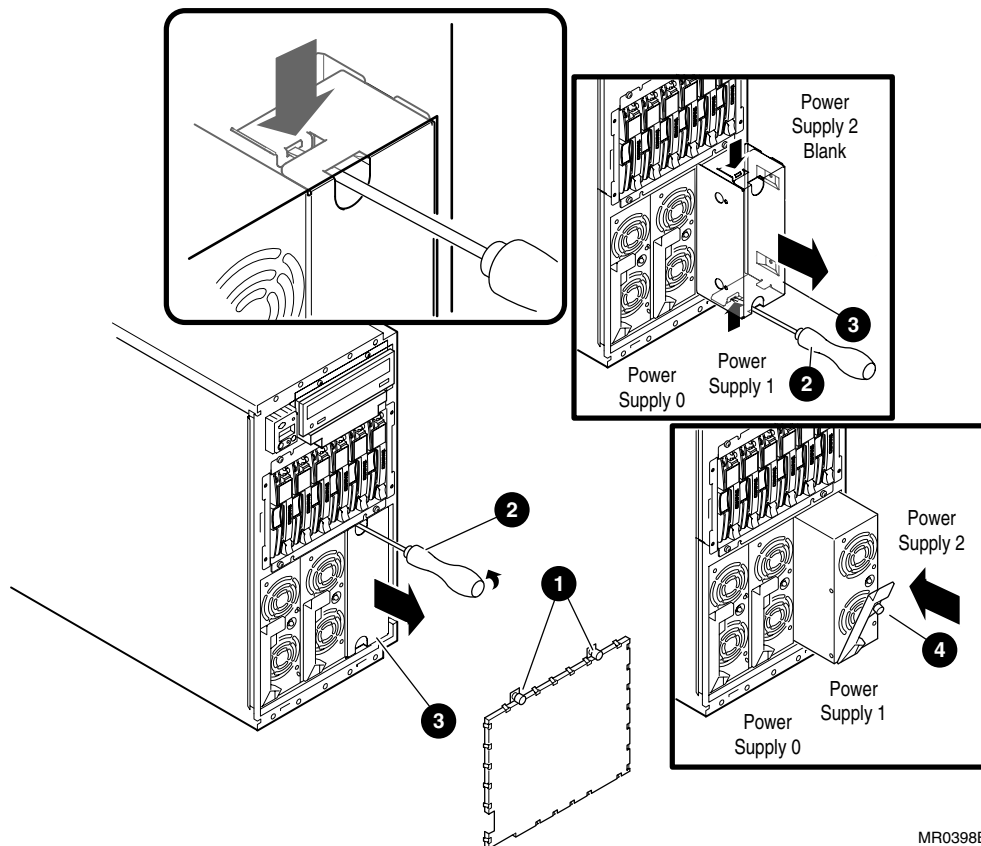
Verification

1. Turn on power to the system.
2. At the P00>>> prompt, enter the SRM **show config** command. Examine the PCI bus information in the display to make sure that the new option is listed.
3. If you installed a bootable device, enter the SRM **show device** command to determine the device name.

4.8 Installing a Redundant Power Supply

Systems containing model FR-H7910-AA power supplies (part number 30-50662-01) require a minimum of three power supplies if the system contains more than 8GB of memory. Systems containing model 3X-H7911-AA power supplies (part number 30-10047-01) require a minimum of two power supplies. A third supply may be added for redundancy.

Figure 4-18 Adding a Third Supply (Pedestal Orientation)



To add a third power supply

1. Loosen the thumbscrews ❶ securing the power supply grid and remove and set aside the grid.
2. Insert a flat-head screwdriver into one of the holes in the power supply blank, engage the slot on the locking tab, and push the tab away from the chassis. ❷
3. Insert the screwdriver into the other hole and free the second locking tab. ❷
4. Slide the blank out of the chassis. ❸
5. Loosen the thumbscrew ❹ on the power supply handle, open the handle, and insert the new power supply into the bay.
6. Push up on the handle to seat the power supply.
7. Reinstall the power supply grid.

To replace a power supply

NOTE: *In a two-supply configuration, shut down the operating system, press the Power button to the Off position, and unplug the power cord before replacing a power supply.*

1. Loosen the thumbscrews ❶ securing the power supply grid and remove the grid.
2. Loosen the thumbscrew ❹ on the power supply handle and then pull it down to release it from the power supply backplane.
3. Using the handle, pull the power supply from the system.
4. Install a new supply as described above.

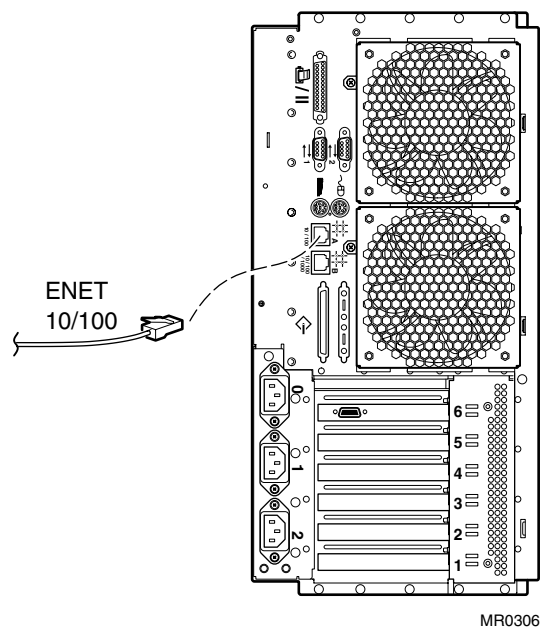
Verification

1. Power up the system.
2. At the P00>>> prompt, enter the **show power** command to verify that the system sees the third supply.

4.9 Network Configuration

An Ethernet option can be installed in any open PCI slot.

Figure 4-19 Network Connection



The DS25 has dual Ethernet and supports various Ethernet network options. The system is configured with 10/100 and 10/100/1000 onboard Ethernet adapters. Supported options are also offered to connect to Fiber Distributed Data Interface (FDDI) networks.

A new network device is initially set to Attachment User Interface (AUI) mode. Use the **set ew*0_mode**, **set ei*0_mode**, or **set eg*0_mode** command described in Chapter 7 to change the mode setting, if necessary.

4.9.1 Ethernet Connection Status LEDs

Figure 4–20 and Table 4–3 contain information about the Ethernet status LEDs.

Figure 4–20 Ethernet Connector LEDs

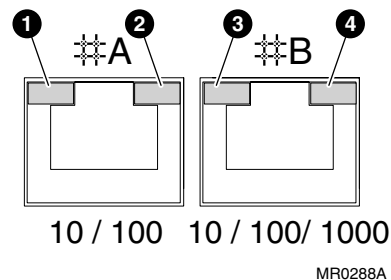


Table 4–3 Ethernet Status LEDs

Ethernet Connector	① Amber	② Green	③ Green/ Orange	④ Amber	Status
A	Blinking	Off	—	—	10Base-T activity
A	—	Off	—	—	10Base-T link
A	Blinking	On	—	—	100Base-TX activity
A	—	On	—	—	100Base-TX link
B	—	—	—	On	10Base-T link
B	—	—	—	Blinking	10Base-T activity
B	—	—	Orange On	On	100Base-TX link
B	—	—	Orange Blinking	Blinking	100Base-TX activity
B	—	—	Green On	On	1000Base-T link
B	—	—	Green Blinking	Blinking	1000Base-T activity

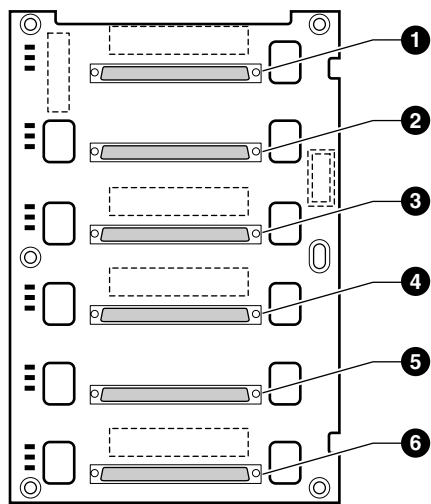
4.10 Disk Drive Configuration

Table 4-4 shows the slot numbering. The SCSI ID for disk drives is preset on the backplane.

Table 4-4 SCSI ID Orientation

Backplane Connector No.	Slot Number	SCSI ID
J4	①	5
J5	②	4
J6	③	3
J7	④	2
J8	⑤	1
J9	⑥	0

Figure 4-21 Disk Backplane Connector Orientation (Rackmount)

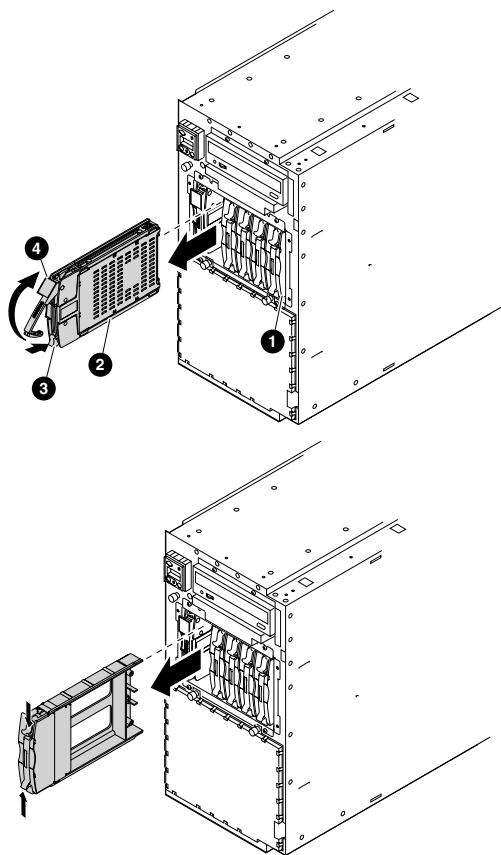


SC0119B

4.11 Installing Disk Drives

The storage subsystem backplane is designed to support hot swap, the installation or removal of drives while the system is powered and operating. Hot swap allows for removal of non-operating drives and does not affect the power for the drives that are in operation.

Figure 4-22 Installing and Removing Disk Drives



MR0307A

CAUTION: *Do not remove a drive that is in operation. A drive should be removed only when its Activity LED is off.*

Installing Drives

1. Insert the drive carrier into the cage with the front handle ❶ fully open. With the carrier resting on top of the rail guides of the cage, slide the carrier in until it stops.
2. Push the handle ❷ in to make the backplane connection and to secure it into the cage.

Removing Drives

1. To remove the carrier, press the colored rubber button ❶ in to release the handle.
2. Pull the handle ❷ forward to release the SCSI connection and then pull the drive out of the cage.

Verification

If you hot-swapped a drive, the Activity LED on the new drive flashes when the drive is inserted. If the system was powered off when you installed the drive, the LED flashes on system power-up.

Also, use the **show device** command to verify that the system sees the new drive.

4.11.1 Drive Status LEDs

Three status LEDs display activity, power, and fault. Figure 4-23 shows the LEDs and their positions on the carrier, and Table 4-5 explains the status of each.

Figure 4-23 Disk Drive LEDs

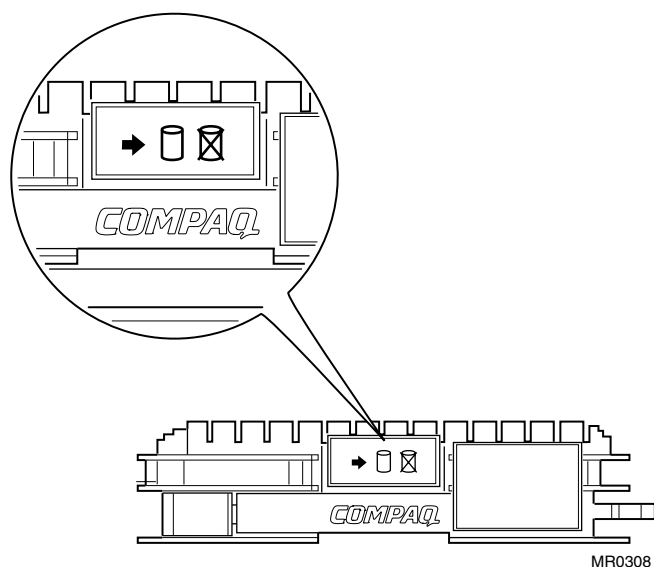


Table 4-5 Drive Status

LED	Status
➔	Green indicates activity.
⬮	Green indicates drive state.
⬮	Amber indicates drive state fault.

4.12 External SCSI Expansion

There are two ways to connect external SCSI devices, such as tabletop or rackmount storage: (a) PCI-based SCSI adapters and (b) the embedded SCSI controller that is accessed through its external bulkhead connector ❶. See Figure 4-24.

SCSI Expansion Rules

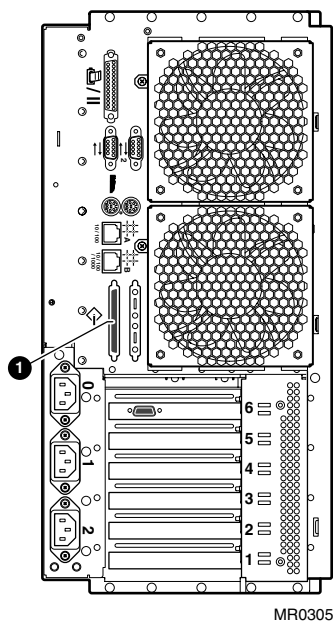
Observe the following rules to determine if a particular device can be used:

- The device must be supported by the operating system. Consult the supported options list.
- Do not exceed the maximum number of devices supported on the SCSI controller to be used.
- Each device on the bus must have a unique SCSI ID.
- The entire SCSI bus length, from terminator to terminator, must not exceed the following limits:

Fast differential SCSI or Ultra SCSI HVD	25 meters
Fast single-ended SCSI	3 meters
Ultra-wide SCSI	1.5 meters
Ultra 2 SCSI LVD	12 meters
Ultra 3 SCSI	12 meters

- Ensure that the SCSI bus is properly terminated and that no devices in the middle of the bus are terminated.
- For best performance, wide devices should be operated in wide SCSI mode.

Figure 4-24 External SCSI



4.13 Updating Firmware

Typically, you update system firmware whenever the operating system is updated. You might also need to update firmware if you add I/O device controllers and adapters or if enhancements are made to the firmware. Firmware is updated from the Loadable Firmware Update utility (LFU). The LFU banner is shown in Figure 4-25.

Figure 4-25 Loadable Firmware Update Utility

```
***** Loadable Firmware Update Utility *****
-----
Function      Description
-----
Display       Displays the system's configuration table.
Exit          Done exit LFU (reset).
List          Lists the device, revision, firmware name, and update
              revision.
Lfu           Restarts LFU.
Readme        Lists important release information.
Update        Replaces current firmware with loadable data image.
Verify        Compares loadable and hardware images.
? or Help     Scrolls this function table.
-----
UPD>
```

4.13.1 Sources of Firmware Updates

The system firmware resides in the flash ROM located on the system board. The Alpha Systems Firmware Update Kit comes on a CD-ROM, which is updated quarterly. You can also obtain Alpha firmware updates from the Internet.

Quarterly Update Service

The Alpha Systems Firmware Update Kit CD-ROM is available by subscription from HP.

Alpha Firmware Internet Access

You can also obtain Alpha firmware update files from the Internet:

<http://ftp.digital.com/pub/DEC/Alpha/firmware/>

If you do not have a Web browser, you can access files using anonymous ftp:

<ftp://ftp.digital.com/pub/DEC/>

Click down the following directories: Alpha/firmware/readme.html

The README file explains how to download firmware updates.

4.13.2 Updating Firmware from the CD-ROM

Use the following procedure to update the firmware from the quarterly CD-ROM. See the Alpha Firmware Web site listed in the Preface for other methods of updating the firmware and to obtain files if you are not updating from the CD.

1. Shut down the operating system.
2. Turn the system off and then on.
3. At the SRM console prompt, enter the **show device** command to determine the drive name of the CD-ROM drive.
4. Load the Alpha Systems Firmware Update CD into the drive.
5. Boot the system from the CD, using the drive name determined in step 1 (for example, dqa0).


```
P00>>> boot dqa0
```
6. At the UPD> prompt, enter the **list** command to list the current revisions of the firmware.
7. Enter the **update** command to update the firmware.
8. When the update is complete, enter the **list** command to verify that the images successfully copied and are listed with the correct revisions.
9. Enter the **exit** command to exit the Firmware Update Utility.

Chapter 5

Firmware

The SRM user interface is the command-line interface that allows you to configure and boot the operating system and verify the configuration of devices.

This chapter describes typical functions performed from the SRM console and the commands and environment variables used for these functions. Key sections of this chapter are:

- SRM Console Overview
- Command Summary
- Getting Help
- Displaying the Configuration
- Displaying the Bootable Devices
- Displaying the Memory Configuration
- Displaying the Power Status
- Displaying the SRM Console Version
- Displaying the CPU Status
- Displaying the PALcode Version
- Booting an Operating System
- Testing the System
- Starting and Stopping CPUs
- Updating Firmware
- Forcing a System Crash Dump
- Initializing the System
- Reading a File
- Creating a Power-up Script
- Setting Console Security
- Setting and Viewing Environment Variables

5.1 SRM Console Overview

The SRM console is the command-line interface that supports the Tru64 UNIX and OpenVMS operating systems and Linux. The SRM console is used to bootstrap the operating system, configure and test the system hardware, examine system options for errors, and set or change environment variables.

The SRM console works much like a UNIX shell. It views your NVRAM and devices as a pseudo file system. The SRM console contains a fairly large set of diagnostic, setup, and debugging utilities, the details of which are beyond the scope of this document. As in the UNIX shell, you can pipe the output of one command to the input of another. You can also use a **more** command that works like the UNIX **more** command. For a full listing of available commands, enter:

```
P00>>> help | more
```

Console Prompt

The SRM console prompt is some variant of >>> (three right angle-brackets). Typically, the prompt is *Pnn*>>>, where *n* indicates the primary processor. In a two-processor system, the prompt is either P00>>> or P01>>>.

Environment Variables

SRM has environment variables, a number of which are predefined and correspond to locations in NVRAM. You can view the entire list of environment variables and their values with the **show** command (there are quite a few of them, so you will probably want to pipe its output to **more**). You can also use the * (asterisk) wildcard to show variables matching a pattern. For example, **show boot*** displays all the variables starting with “boot.” The environment variables are described in Section 5.20. Boot environment variables are described in Chapter 4.

5.1.1 Invoking the SRM Console

You can invoke the SRM console at power-up or restart or after a system failure. Once you invoke SRM, you enter commands at the console prompt.

Invoking SRM from Tru64 UNIX, Linux, or OpenVMS

The SRM console is invoked automatically at power-up or after a reset or failure. The **auto_action** environment variable is set by default to **halt**, which causes the system to stop in the SRM console.

If the operating system is running, invoke the SRM console by shutting down the operating system. Follow the shutdown procedure described in your operating system documentation.

You can also force entry to the SRM console if the **auto_action** environment variable is set to **boot** or **reset**. To force entry, press the Halt button on the control panel.

CAUTION: *A forced halt interrupts the operating system. Applications that are running may lose data.*

To return to operating system mode, issue the **boot** command.

Returning to SRM from RMC

If you invoked the RMC from the SRM console, you can return to the SRM console by entering the RMC **quit** command.

5.2 Command Summary

Table 5-1 summarizes alphabetically the most frequently used SRM console commands; Table 5-2 gives the command notation formats; and Table 5-3 shows special characters used on the command line.

Table 5-1 Summary of SRM Console Commands

Command	Function
boot	Loads and starts the operating system.
clear <i>envvar</i>	Resets an environment variable to its default value.
continue	Resumes program execution on the specified processor or on the primary processor if none is specified.
crash	Forces a crash dump at the operating system level.
edit	Invokes the console line editor on a RAM script or on the user power-up script, “nvram,” which is always invoked during the power-up sequence.
halt	Halts the specified processor. (Same as stop .)
help (or man) <i>command</i>	Displays information about the specified console command.
init	Resets the SRM console and reinitializes the hardware.

Continued on next page

Table 5–1 Summary of SRM Console Commands (Continued)

Command	Function
lfu	Runs the Loadable Firmware Update utility.
login	Turns off secure mode, enabling access to all SRM console commands during the current session.
more <i>[filename]</i>	Displays a file one screen at a time.
set <i>envar</i>	Sets or modifies the value of an environment variable.
show <i>envar</i>	Displays the state of the specified environment variable.
stop	Halts the specified processor. (Same as halt .)
test	Verifies the configuration of the devices in the system.

Table 5–2 Notation Formats for SRM Console Commands

Attribute	Conditions
Length	Up to 255 characters, not including the terminating carriage return or any characters deleted as the command is entered. To enter a command longer than 80 characters, use the backslash character for line continuation (see Table 5–3).
Case	Upper- or lowercase characters can be used for input. Characters are displayed in the case in which they are entered.
Abbreviation	Only by dropping characters from the end of words. You must enter the minimum number of characters to identify the keyword unambiguously. Abbreviation of environment variables is allowed with the show command.
Options	You can use command options, to modify the environment, after the command keyword or after any symbol or number in the command. See individual command descriptions for examples.
Numbers	Most numbers in console commands are in decimal notation.
No characters	A command line with no characters is a null command. The console program takes no action and does not issue an error message; it returns the console prompt. The console supports command-line recall and editing.
Spaces or tabs	Multiple adjacent spaces and tabs are compressed and treated as a single space. Leading and trailing spaces are ignored.

Table 5–3 Special Characters for SRM Console

Character	Function
Return or Enter	Terminates a command line. No action is taken on a command until it is terminated. If no characters are entered and this key is pressed, the console just redisplay the prompt.
Backslash (\)	Continues a command on the next line. Must be the last character on the line to be continued.
Delete	Deletes the previous character.
Ctrl/A	Toggles between insert and overstrike modes. The default is overstrike.
Ctrl/B or up-arrow	Recalls previous command or commands. The last 16 commands are stored in the recall buffer.
Ctrl/C	Terminates the process that is running. Clears Ctrl/S; resumes output suspended by Ctrl/O. When entered as part of a command line, deletes the current line. Ctrl/C has no effect as part of a binary data stream.
Left-arrow	Moves the cursor left one position.
Ctrl/E	Moves the cursor to the end of the line.
Ctrl/F or right-arrow	Moves the cursor right one position.
Ctrl/H	Moves the cursor to the beginning of the line.
Backspace	Deletes one character.
Ctrl/J	Deletes the previous word.
Ctrl/O	Stops output to the console terminal for the current command. Toggles between enable and disable. The output can be reenabled by other means as well: when the console prompts for a command, issues an error message, or enters program mode, or when Ctrl/P is entered.

Table 5-3 Special Characters for SRM Console (Continued)

Character	Function
Ctrl/Q	Resumes output to the console terminal that was suspended by Ctrl/S.
Ctrl/R	Redisplays the current line. Deleted characters are omitted. This command is useful for hardcopy terminals.
Ctrl/S	Suspends output to the console terminal until Ctrl/Q is entered. Cleared by Ctrl/C.
Ctrl/U	Deletes the current line.
*	Wildcarding for commands such as show .
" "	Double quotes enable you to denote a string for environment variable assignment.
#	Specifies that all text between it and the end of the line is a comment. Control characters are not considered part of a comment.

5.3 Getting Help

The `help` (or `man`) command displays basic information about a command.

Example 5-1 Help (or Man)

```
P00>>> help set
NAME
    set
FUNCTION
    Set or modify the value of an environment variable.
SYNOPSIS
    set <envar> <value>
        [-integer] [-string]
        where
        <en-
var>={auto_action,bootdef_dev,boot_file,boot_osflags,...}
```

The **help** (or **man**) command displays basic information about the use of console commands when the system is in console mode. The syntax is:

help (or **man**) [*command* . . .]

command . . . Command or topic for which help is requested. The options are:

none Displays the complete list of commands for which you can receive help.

command_name Displays information about the console command.

argument_string Displays information about all commands that begin with that string.
(such as “sh”)

5.4 Displaying the Configuration

Use the **show config** command to display a list of devices found on the system interconnect and I/O buses. This is the configuration at the most recent initialization.

Example 5-2 Show Config

```
P00>>> sho config
hp AlphaServer DS25

Firmware
SRM Console: V6.3-1
PALcode: OpenVMS PALcode V1.96-40, Tru64 UNIX PALcode V1.90-31
Serial ROM: V1.3-F
RMC ROM: G1.4
RMC Flash ROM: V1.1

Processors
CPU 0 Alpha EV68CB pass 2.4 1000 MHz 8MB Bcache
CPU 1 Alpha EV68CB pass 2.4 1000 MHz 8MB Bcache

Core Logic
Cchip Rev 18
Dchip Rev 17
PPchip 0 Rev 17
PPchip 1 Rev 17
TIG Rev 2.6

Memory
Array Size Base Address Intlv Mode
-----
0 512Mb 0000000040000000 1-Way
2 1024Mb 0000000000000000 1-Way

1536 MB of System Memory

Slot Option Hose 0, Bus 0, PCI - 33 MHz
7 Acer Labs M1543C Bridge to Bus 1, ISA
8 Intel 82559ER Ethernet eia0.0.0.8.0 00-02-A5-20-00-DD
12 Yukon PCI Hot-Plug C
16 Acer Labs M1543C IDE dqa.0.0.16.0
dqb.0.1.16.0
dqa0.0.0.16.0 CD-224E

Option Hose 0, Bus 1, ISA
Floppy dva0.0.0.1000.0

Slot Option Hose 2, Bus 0, PCI - 66 MHz
1/0 Adaptec AIC-7899 pka0.7.0.1.2 SCSI Bus ID 7
dka0.0.0.1.2 COMPAQ BD01862A67
dka100.1.0.1.2 COMPAQ BF01863644
1/1 Adaptec AIC-7899 pkb0.7.0.101.2 SCSI Bus ID 7
```

```

5      BCOM Gigabit 5703c      ega0.0.0.5.2      00-02-A5-20-7F-AC
Slot  Option                  Hose 3, Bus 0, PCI - 66 MHz
1      ELSA GLoria Synergy    vga0.0.0.1.3
6      Yukon PCI Hot-Plug C
P00>>>

```

- ❶ **Firmware.** Version numbers of the SRM console, PALcode, serial ROM, RMC ROM, and RMC flash ROM
- ❷ **Processors.** Processors present, processor version and clock speed, and amount of backup cache
- ❸ **Core logic.** Version numbers of the chips that form the interconnect on the system board
- ❹ **Memory.** Memory arrays and memory size
- ❺ This part of the command output shows the PCI buses.

The “Slot” column lists the slots (logical IDs) seen by the system. Logical IDs identify both installed PCI cards and onboard chips. In this example, the onboard chips include the Yukon PCI hot-plug controller and the Acer Labs M1543C IDE.

The logical IDs do not correspond directly to the physical slots into which the devices are installed.

NOTE: The naming of devices (for example, dqa.0.0.16.0) follows the conventions given in Table 5–5.

Hose 0, Bus 0, PCI

```

Slot 7      Onboard Acer chip. Provides bridge to Bus 1
Slot 8      Onboard Ethernet
Slot 12     Onboard PCI hot-plug controller
Slot 16     Onboard Acer chip

```

Hose 0, Bus 1

Hose 2, Bus 0, PCI

```

Slots 1/0, 1/1  Adaptec controller.
Slot 5          Broadcom gigabit Ethernet controller

```

Hose 3, Bus 0, PCI

```

Slot 1      ELSA Gloria Synergy
Slot 6      Onboard PCI hot-plug controller

```

The slots in Example 5–2 are explained below.

Table 5-4 How Physical I/O Slots Map to Logical Slots

Physical Slot	SRM Logical Slot ID
1	Hose 0 Slot ID 1
2	Hose 0 Slot ID 2
3	Hose 3 Slot ID 2
4	Hose 3 Slot ID 1
5	Hose 1 Slot ID 9
6	Hose 1 Slot ID 10

5.5 Displaying the Bootable Devices

The show device command displays the devices and controllers in the system, including the bootable devices.

Example 5-3 Show Device

```
P00>>> show device
dqa0.0.0.16.0          DQA0          HL-DT-ST GCE-8302B 2.01
dva0.0.0.1000.0*       DVA0
ega0.0.0.5.2           EGA0          00-00-00-00-00-00
eia0.0.0.8.0           EIA0          40-00-04-A5-F8-00
pka0.7.0.1.2           PKA0          SCSI Bus ID 7
pkb0.7.0.101.2         PKB0          SCSI Bus ID 7

P00>>>
```

* DS25 systems have no floppy drives.

Table 5-5 Device Naming Conventions

	Category	Description
dk	Driver ID	Two-letter designator of port or class driver
		dk SCSI drive or CD ew Ethernet port
		dq IDE CD-ROM fw FDDI device
		dr RAID set device mk SCSI tape
		du DSSI disk mu DSSI tape
		eg Ethernet port pu DSSI port
		ei Ethernet port
a	Storage adapter ID	One-letter designator of storage adapter (a, b, c...).
0	Device unit number	Unique number (MSCP unit number). SCSI unit numbers are forced to 100 X node ID.
0	Bus node number	Bus node ID.
0	Channel number	Used for multi-channel devices.
16	Logical slot num.	Corresponds to logical slot number (see example above)
0	Hose number	Hose 0, 1, 2, 3

5.6 Displaying the Memory Configuration

Use the **show memory** command to display information about each memory array: array number, size in megabytes, starting address, and interleave mode. The display also shows the total amount of good memory. It does not indicate the number of DIMMs or their size.

Example 5-4 Show Memory

```
P00>>> show memory
```

Array	Size	Base Address	Intlv Mode
0	1024Mb	0000000000000000	1-Way

```
1024 MB of System Memory
P00>>>
```

5.7 Displaying the Power Status

Use the **show power** command to display information about status of the power supplies, system fans, CPU fans, and temperature. See Chapter 7 for troubleshooting with the **show power** command.

Example 5-5 Show Power

```
P00>>> show power

Power Supply 0      Status
Power Supply 1      Good
Power Supply 2      Good
System Fan 0        Good
System Fan 1        Good
CPU0 Fan            Good
CPU1 Fan            Good
PCI Fan             Good
CPU 0 Temperature   Good
CPU 1 Temperature   Good
Zone 0 Temperature   Good
Zone 1 Temperature   Good
Zone 2 Temperature   Good
P00>>>
```

5.8 Displaying the SRM Console Version

Use the show version command to display the version of the SRM console that is installed.

Example 5-6 Show Version

```
P00>>> sho version
version                V6.3-1 Jun  3 2002 14:05:03
P00>>>
```

5.9 Displaying the CPU Status

Use the `show cpu` command to display the status of each CPU. CPU slot 0 is the right slot in a rack system and the top slot in a pedestal system.

Example 5-7 Show CPU

```
P00>>> show cpu
```

```
Primary CPU:      00
Active CPUs:      00      01
Configured CPUs:  00      01
```



- ❶ The CPUs have been brought successfully online and are ready to run an operating system.

5.10 Displaying the PALcode Version

Use the `show pal` command to display the version of Tru64 UNIX or OpenVMS PALcode. The PALcode is the Alpha Privileged Architecture Library code, written to support Alpha processors. It implements architecturally defined processor behavior.

Example 5-8 Show Pal

```
P00>>> sho pal
pal                               OpenVMS PALcode V1.96-40, Tru64 UNIX
PALcode V1.90-31
P00>>>
```

5.11 Booting an Operating System

The boot command boots the Tru64 UNIX, Linux, or OpenVMS operating system. You can specify a boot device, operating system-specific boot information (boot flags), and an Ethernet protocol for network boots. You can also specify whether the boot program should halt and remain in console mode.

Example 5-9 Tru64 UNIX Boot (Abbreviated)

```
P00>>> boot dka200
boot dka200.2.0.1.2 -flags 0,0)
block 0 of dka200.2.0.1.2 is a valid boot block
reading 14 blocks from dka200.2.0.1.2
bootstrap code read in
base = 314000, image_start = 0, image_bytes = 1c00(7168)
initializing HWRPB at 2000
initializing page table at 5fff0000
initializing machine state
setting affinity to the primary CPU
jumping to bootstrap code

UNIX boot - Wednesday August 01, 2001

Loading vmunix
.
.
.

The system is ready.

Compaq Tru64 UNIX V5.1A (Rev. 1885) (QA0005.mro.cpqcorp.net) console
login:
```

The **boot** command initializes the processor, loads a program image from the specified boot device, and transfers control to that image. If you do not specify a boot device in the command line, the default boot device is used. The default boot device is determined by the value of the **bootdef_dev** environment variable, described in Chapter 4.

If you specify a list of boot devices, a bootstrap is attempted from each device in order. Then control passes to the first successfully booted image. In a list, always enter network devices last, because network bootstraps terminate only if a fatal error occurs or when an image is successfully loaded.

The syntax is:

boot [-file *filename*] [-flags [*value*]] [-halt] [-protocols *enet_protocol*]
[*boot_dev*]

-file *file-name* Specifies the name of a file to load into the system. Use the **set boot_file** command to set a default boot file. See Chapter 4.

NOTE: *For booting from Ethernet, the filename is limited by the MOP V3 load protocol to 15 characters. The MOP protocol is used with OpenVMS systems.*

-flags [*value*] Provides additional operating system-specific boot information. In *Tru64 UNIX*, specifies boot flags. In *OpenVMS*, specifies system root number and boot flags. These values are passed to the operating system for interpretation. Preset default boot flag values are 0,0. Use the **set boot_osflags** command to change the default boot flag values. See Chapter 4.

-halt Forces the bootstrap operation to halt and invoke the console program. The console is invoked after the bootstrap image is loaded and page tables and other data structures are set up. Console device drivers are not shut down. Transfer control to the bootstrap image by entering the **continue** command.

-protocols *enet_protocol* Specifies the Ethernet protocol to be used for the network boot. Either **mop** (for *OpenVMS*) or **bootp** (for *Tru64 UNIX*) may be specified. Use the **set ew*0_protocols**, **ei*0_protocols**, or **eg*0_protocols** command to set a default network boot protocol. See Chapter 4.

boot_dev A device path or list of devices from which the console program attempts to boot, or a saved boot specification in the form of an environment variable. Use the **set bootdef_dev** command to set a default boot device. See Chapter 4.

NOTE: *Entering values for boot flags, the boot device name, or Ethernet protocol on the **boot** command overrides the current default value for the current boot request, but does not change the corresponding environment variable. For example, if you have defined a value for **boot_osflags** and you specify the **-flags** argument on the **boot** command line, the **-flags** argument takes precedence for that boot session.*

5.12 Testing the System

Use the test command to run firmware diagnostics for components of the system. Use Ctrl/C to abort testing.

Example 5-10 Test

```
P00>>> test
Default zone extended at the expense of memzone.
Use INIT before booting
Testing Ethernet device(s)
Testing Memory
Testing IDE/ATAPI disks (read-only)
Testing SCSI disks (read-only)
dqa0.0.0.105.0 has no media present or is disabled via the RUN/STOP
switch
file open failed for dqa0.0.0.105.0
Testing drive
^C
P00>>>
```

The **test** command tests the entire system, a subsystem, or a specified device. If no device or subsystem is specified, the entire system is tested.

To run a complete diagnostic test using the **test** command, the system configuration must include a CD ROM and loopback connectors on COM2 and the parallel port.

The command syntax is:

t[est][*-write*][*-nowrite*"list"][*-omit* "list"][*-t time*][*-q*][*dev_arg*]

-write	Specifies that data will be written to the specified device
-nowrite	Specifies that data will not be written to the device specified in the "list"
-lb	Specifies loopback testing
-omit	Specifies that the devices in the "list" are not to be tested
-t	Specifies the amount of time the test command is to run
-q	Defines data size as a quadword (64 bits). All values default to 8 bytes.
<dev_arg>	Specifies the target device, group of devices, or subsystem to test

For example:

```
P00>>> t pci0 -t 60
```

In this example, the **test** command tests all devices associated with the PCI0 subsystem. Test run time is 60 seconds. When a subsystem or device is specified, tests are executed on the associated modules first, then the appropriate exercisers are run.

5.13 Starting and Stopping CPUs

Use the **halt** and **continue** commands to stop and continue a program on the specified CPU.

Example 5-11 Halt and Continue

```
P00>>> halt 1
halted CPU 1
halt code = 1
operator initiated halt
PC = ffffffff8007cc68
P00>>> continue &p1
continuing CPU 1
```

5.13.1 halt (or stop)

The **halt** (or **stop**) command stops program execution on a secondary CPU that is still running a booted program. The syntax is:

halt (or **stop**) *processor_number*

The *processor_number* is the logical CPU number displayed by the **show cpu** command.

5.13.2 continue

The **continue** command resumes program execution on the specified processor or on the primary processor if none is specified. The processor begins executing instructions at the address that is currently in the program counter (PC). The processor is not initialized.

The **continue** command is valid only if you have not disturbed the system state and if you halted the system by pressing the Halt button on the control panel or, for *OpenVMS* systems only, by entering Ctrl/P on the console terminal.

The syntax is:

continue [**&pn**] [*address*]

&pn Specifies the processor. *n* is 0 or 1.

address The starting address of the program.

NOTE: *Some console commands, for example, **boot**, can alter the machine state so that program mode cannot be successfully resumed (unless you include **-halt** in the **boot** command). If you cannot resume program execution, reboot the operating system.*

*Other commands that alter machine state are **lfu** and **test**.*

5.14 Updating Firmware

Use the lfu command to update firmware. Example 5-12 shows a typical update from a CD-ROM. For more information on updating firmware, see Chapters 2 and 4 of this manual and the Alpha Systems Firmware Web site.

Example 5-12 Updating Firmware from a CD

```
P00>>> lfu
```

```
Checking dqa0.0.0.16.0 for the option firmware files. . .
dqa0.0.0.16.0 has no media present or is disabled via the RUN/STOP switch
Checking dva0.0.0.1000.0 for the option firmware files. . .
```

```
Option firmware files were not found on CD or floppy.
If you want to load the options firmware,
please enter the device on which the files are located(ewa0),
or just hit <return> to proceed with a standard console update: dqa0
Please enter the name of the options firmware files list, or
Hit <return> to use the default filename (ds25fw.txt) :
Copying ds25fw.txt from dqa0. . .
Copying DFXAA320 from dqa0. . .
Copying KZPSAA12 from dqa0. . .
Copying CIPCA420 from dqa0. . .
Copying FC2381A4 from dqa0. . .
Copying KG8381A4 from dqa0. . .
Copying PCCFWQ16 from dqa0. . .
Copying PCCSM112 from dqa0. . .
```

```
***** Loadable Firmware Update Utility *****
```

Function	Description
Display	Displays the system's configuration table.
Exit	Done exit LFU (reset).
List	Lists the device, revision, firmware name, and update revision.
Update	Replaces current firmware with loadable data image.
Verify	Compares loadable and hardware images.
? or Help	Scrolls this function table.

```
UPD>
```

Procedure for Updating from a CD

1. Copy the firmware files, as described on the Alpha Systems Firmware Web site.
2. The update utility runs and says that files were not found on CD, but then asks on which device the files are located.
3. Insert the CD into the drive on the system and enter the **lfu** command from SRM.
4. Type **dqa0**.
5. The LFU then prompts for the name of the firmware files list. Press Return. The default file, DS25fw.txt, will be on the CD.
6. When completed, type **done**.

Example 5-13 Updating Firmware from a CD (Continued)

```
UPD> list
```

Device	Current Revision	Filename	Update Revision
FSB	V6.3-2	fsb_fw	V6.3-2
SRM	V6.3-1	srm_fw	V6.3-1
srom	V1.3-F	srom_fw	V1.3-F
		cipca_fw	A420
		dfxaa_fw	3.20
		fca_2354_fw	CS3.81A4
		kgpsa_8k_fw	DS3.81A4
		kzpcc_smor	1.12
		kzpcc_fw	CQ16
		kzpsa_fw	A12

```
UPD>
```

```
UPD> u srm
Confirm update on:
srm
[Y/(N)]y
WARNING: updates may take several minutes to complete for each device.
DO NOT ABORT!

srm          Updating to 6.3-1...  Verifying 6.3-1...  PASSED.

UPD> u fsb
Confirm update on:
fsb
[Y/(N)]y
WARNING: updates may take several minutes to complete for each device.
DO NOT ABORT!

fsb          Updating to 6.3-2...  Verifying 6.3-2...  PASSED.

UPD> list
.
.
.
UPD> exit
```

7. At the UPD> prompt, enter the **list** command to view the firmware revisions. Then enter the **update** command as appropriate to each device.
8. When done, enter the **list** command to see that the images successfully copied and are listed with the correct revision.

5.15 Forcing a System Crash Dump

For fatal errors the operating system will save the contents of memory to a crash dump file. Crash dump files can be used to determine why the system crashed. Use the crash command to force a crash dump.

Example 5-14 Crash

```
P00>>> crash
CPU 0 restarting
DUMP: 401408 blocks available for dumping.
DUMP: 38535 required for a partial dump.
DUMP: 0x805001 is the primary swap with 401407, start our last 38534
of dump at 362873, going to end (real end is one more, for header)
DUMP.prom: dev SCSI 1 3 0 4 400 0 0, block 131072
DUMP: Header to 0x805001 at 401407 (0x61fff)
DUMP.prom: dev SCSI 1 3 0 4 400 0 0, block 131072
DUMP: Dump to 0x805001: .....: End 0x805001
DUMP.prom: dev SCSI 1 3 0 4 400 0 0, block 131072
DUMP: Header to 0x805001 at 401407 (0x61fff)
succeeded
halted CPU 0
halt code = 5
HALT instruction executed
PC = fffffc00004e2d64
P00>>>
```

The **crash** command forces a crash dump at the operating system level. This command can be used when an error has caused the system to hang and the system can be halted with the Halt button or the RMC **halt** command. The **crash** command restarts the operating system and forces a crash dump to the selected device. The syntax is:

crash [*device*]

The *device* is the name of the device to which the crash dump is written.

5.16 Initializing the System

The init command resets the system and executes the power-up tests.

Example 5-15 Init

```
P00>>> init
Initializing...
```

```
OpenVMS PALcode V1.96-40, Tru64 UNIX PALcode V1.90-31
```

```
starting console on CPU 0
initialized idle PCB
initializing semaphores
initializing heap
initial heap 240c0
memory low limit = 20e000
heap = 240c0, 17fc0
initializing driver structures
initializing idle process PID
initializing file system
initializing timer data structures
lowering IPL
CPU 0 speed is 1000 MHz
create dead_eater
create poll
create timer
create powerup
access NVRAM
1024 MB of System Memory
Testing Memory
...
probe I/O subsystem
Hose 0 - PCI bus running at 33Mhz
entering idle loop
probing hose 0, PCI
probing PCI-to-ISA bridge, bus 1
bus 0, slot 8 -- eia -- Intel 82559ER Ethernet
bus 0, slot 9 -- vga -- 3D Labs OXYGEN VX1
```

```

bus 0, slot 16 -- dqa -- Acer Labs M1543C IDE
bus 0, slot 16 -- dqb -- Acer Labs M1543C IDE
Hose 1 - PCI bus running at 66Mhz
probing hose 1, PCI
Hose 2 - PCI bus running at 66Mhz
probing hose 2, PCI
bus 0, slot 1, function 0 -- pka -- Adaptec AIC-7899
bus 0, slot 1, function 1 -- pkb -- Adaptec AIC-7899
bus 0, slot 5 -- ega -- BCOM NIC Gigabit
Hose 3 - PCI bus running at 33Mhz
probing hose 3, PCI
starting drivers
initializing keyboard
starting console on CPU 1
initialized idle PCB
initializing idle process PID
lowering IPL
CPU 1 speed is 1000 MHz
create powerup
initializing GCT/FRU at 242000
initializing ega ? ega0.0.0.5.2 - 4 - Link failed to come up: reg
7949
? ega0.0.0.5.2 - 5 - Link failed to come up: reg 7949
dqa dqb eia pka pkb
Memory Testing and Configuration Status
  Array      Size      Base Address      Intlv Mode
  -----
      0      1024Mb      0000000000000000      1-Way

      1024 MB of System Memory
Testing the System
Testing the Disks (read only)
Testing the Network
AlphaServer DS25 Console V6.3-1, built on May 15 2002 at
12:02:20
P00>>>

```

The **init** command resets the system. Issuing this command is equivalent to pressing the Reset button. The syntax is:

init

After self-tests are executed, the system autoboots unless one of the following is true:

- A halt assertion exists (see Chapter 6).
- The **auto_action** environment variable is set to **halt**.

If the **auto_action** environment variable is set to **boot** or **restart** and no halt assertion condition exists, the system autoboots. In all other cases, the system stops in console mode and does not attempt to boot.

5.17 Reading a File

The more command displays a file one screen at a time.

Example 5-16 More

```
P00>>> more el
*** keyboard not plugged in...
384 Meg of system memory
probing hose 1, PCI
bus 0, slot 7 -- pka -- NCR 53C895
probing hose 0, PCI
probing PCI-to-ISA bridge, bus 1
bus 0, slot 5, function 1 -- dqa -- Cypress 82C693 IDE
bus 0, slot 5, function 2 -- dqb -- Cypress 82C693 IDE
bus 0, slot 6, function 0 -- pkb -- Adaptec AIC-7895
bus 0, slot 6, function 1 -- pkc -- Adaptec AIC-7895
bus 0, slot 7 -- vga -- ELSA GLoria Synergy
bus 0, slot 9 -- ewa -- DE500-AA Network Controller
resetting the SCSI bus on pka0.7.0.7.1
port pka0.7.0.7.1 initialized, scripts are at 1d2500
port dqa.0.0.105.0 initialized
port dqb.0.1.205.0 initialized
device dqa0.0.0.105.0 (CD-224E) found on dqa0.0.0.105.0
device dka100.1.0.7.1 (COMPAQ BD018122C9) found on pka0.1.0.7.1
device dka200.2.0.7.1 (COMPAQ BD018122C9) found on pka0.2.0.7.1
environment variable aa_value_bcc created
environment variable aa_2x_cache_size created
environment variable mstart created
environment variable mend created
--More-- (SPACE - next page, ENTER - next line, Q - quit)
```

The **more** command is similar to the UNIX **more** command. It is useful for displaying output that scrolls too quickly to be viewed. For example, when you power up the system, the system startup messages scroll, and the messages are logged to an event log. When the P00>>> prompt displays, you can use the **more** command to display the contents of the event log file. See Example 5–16.

The syntax is:

more [*file*...]

The *file* is the name of the file to be displayed.

NOTE: *If you misspell the word "more," the console hangs. Enter Ctrl/x to remove the hang condition.*

5.18 Creating a Power-Up Script

The system comes with a special nonvolatile file named “nvram” that is stored in EEROM. Nvram is a user-created power-up script (set of commands) that is always invoked during the power-up sequence. Use the SRM edit command to create or alter the nvram script.

Example 5-17 Editing the Nvram Script

```
P00>>> edit nvram
editing 'nvram'
0 bytes read in
*10 set ewa0_protocols bootp
*list
10 set ewa0_protocols bootp
*exit
27 bytes written out to nvram
```

This example shows how to modify the user-created power-up script, “nvram.” In this example the script is edited to include a command that allows you to boot the *Tru64 UNIX* operating system over the network.

Example 5-18 Clearing the Nvram Script

```
P00>>> edit nvram
editing 'nvram'
20 bytes read in
*10
*exit
0 bytes written out to nvram
P00>>>
```

To clear the script, enter line numbers without any text. This deletes the lines.

Editing the Nvram Script

You can create an nvram script to include any commands you want the system to execute at power-up.

You create and edit the nvram script using the SRM **edit** command. With **edit**, lines may be added, overwritten, or deleted.

The syntax is:

edit *file*

file is the name of the file to be edited.

The editing commands are:

help	Displays the brief help file.
list	Lists the current file prefixed with line numbers.
renumber	Renumbers the lines of the file in increments of 10.
exit	Leaves the editor and closes the file, saving all changes.
quit	Leaves the editor and closes the file without saving changes.
<i>nn</i>	Deletes line number <i>nn</i> .
<i>nn text</i>	Adds or overwrites line number <i>nn</i> with <i>text</i> .

CAUTION: *Use caution when editing the nvram script. It is possible to disable the system by including an inappropriate command. For example, if you include the **init** command in the script, the system will go into an endless loop.*

*To correct this error, press the Halt button or issue the RMC **halt** command, then power up or reset the system. When the P00>>> prompt is displayed, edit the nvram script to remove the illegal command.*

5.19 Setting Console Security

The SRM console firmware has console security features intended to prevent unauthorized personnel from modifying the system parameters or otherwise tampering with the system from the console. The security features include a secure mode and commands to set console security.

5.19.1 Overview of Secure Mode

The SRM console has two modes, user mode and secure mode.

- User mode allows you to use all SRM console commands. User mode is the default mode.
- Secure mode allows you to use only the **boot** and **continue** commands. The **boot** command cannot take command-line parameters when the console is in secure mode. The console boots the operating system using the environment variables stored in NVRAM (**boot_file**, **bootdef_dev**, **boot_flags**).

Secure Function Commands

- The **set password** and **set secure** commands are used to set secure mode.
 - The **clear password** command is used to exit secure mode and return to user mode. All the SRM console commands are available and the console is no longer secure.
 - The **login** command turns off console security for the current console session. Once you enter the **login** command in secure mode, you can enter any SRM command as usual. However, the system automatically returns to secure mode when you enter the **boot** or **continue** command or when you reset the system.
-

NOTE: *The security features work only if access to the system hardware is denied to unauthorized personnel. Be sure the system is available only to authorized personnel.*

5.19.2 Setting the Console Password

Set the console password with the set password command. A password is required for operating the system in secure mode.

Example 5-19 Set Password

```
P00>>> set password ❶
Please enter the password:
Please enter the password again:
P00>>>

P00>>> set password ❷
Please enter the password:
Please enter the password again:
Now enter the old password:
P00>>>

P00>>> set password
Please enter the password:
Password length must be between 15 and 30 characters ❸
P00>>>
```

- ❶ Setting a password. If a password has not been set and the **set password** command is issued, the console prompts for a password and verification. The password and verification are not echoed.
- ❷ Changing a password. If a password has been set and the **set password** command is issued, the console prompts for the new password and verification, then prompts for the old password. The password is not changed if the validation password entered does not match the existing password stored in NVRAM.
- ❸ The password length must be between 15 and 30 alphanumeric characters. Any characters entered after the 30th character are not stored.

The **set password** command sets the console password for the first time or changes an existing password. It is necessary to set the password only if the system is going to operate in secure mode.

The syntax is:

set password

5.19.3 Setting the Console to Secure Mode

To set the console to secure mode, first set the password. Then enter the set secure command. The system immediately enters secure mode.

Example 5-20 Set Secure

```
P00>>> set secure ❶
Console is secure. Please login.
P00>>> b dkb0
Console is secure - parameters are not allowed.
P00>>> login ❷
Please enter the password:
P00>>> b dkb0
(boot dkb0.0.0.3.1)
.
.
.
```

- ❶ The console is put into secure mode, and then the operator attempts to boot the operating system with command-line parameters. A message is displayed indicating that boot parameters are not allowed when the system is in secure mode.
- ❷ The **login** command is entered to turn off security features for the current console session. After successfully logging in, the operator enters a **boot** command with command-line parameters.

The **set secure** command enables secure mode. If no password has been set, you are prompted to set the password. Once you set a password and enter the **set secure** command, secure mode is in effect immediately and only the **continue**, **boot** (using the stored parameters), and **login** commands can be performed.

The syntax is:

set secure

5.19.4 Turning Off Security During a Console Session

The **login** command turns off the security features, enabling access to all SRM console commands during the current console session. The system automatically returns to secure mode as soon as the boot or continue command is entered or when the system is reset.

Example 5-21 Login

```
P00>>> login                                ❶
Secure not set. Please set the password.
P00>>> set password                          ❷
Please enter the password:
Please enter the password again:
P00>>> login                                ❸
Please enter the password.
P00>>> show boot*
```

- ❶ The **login** command is entered, but the system is not in secure mode. A password must be set.
- ❷ A password is set.
- ❸ The **login** command is entered. After the password is entered, console security is turned off for the current session and the operator can enter commands.

When you enter the **login** command, you are prompted for the current system password. If a password has not been set, a message is displayed indicating that there is no password in NVRAM. If a password has been set, this prompt is displayed:

Please enter the password:

If the password entered matches the password in NVRAM, when the prompt is redisplayed the console is no longer in secure mode and all console commands can be performed during the current console session.

NOTE: *If you enter the **login** command when a halt assertion exists, the command fails, even if you enter the correct password.*

If You Forget the Password

You can clear the password from the local console terminal or from the RMC.

From the Local Console Terminal

If you forget the current password, use the **login** command in conjunction with the control panel Halt button to clear the password, as follows:

1. Enter the **login** command:

```
P00>>> login
```

2. When prompted for the password, press the Halt button to the latched position and then press the Return (or Enter) key.

The password is now cleared and the console cannot be put into secure mode unless you set a new password.

From the RMC

1. From the SRM console, enter the **login** command:

```
P00>>> login
```

2. At the Enter Password: prompt, type the RMC escape sequence.
3. AT the RMC>>> prompt, enter the **halt** command and then the **quit** command:

```
RMC>>> halt  
RMC>>> quit
```

4. At the SRM console, clear the password

```
P00>>> clear password  
  
Please enter the password:  
Password successfully cleared.  
P00>>>
```

5.19.5 Returning to User Mode

The **clear password** command clears the password environment variable, setting it to zero. Once the password is cleared, you are returned to user mode.

Example 5-22 Clear Password

```
P00>>> clear password
Please enter the password:
Console is secure
P00>>> clear password
Please enter the password:
Password successfully cleared.
P00>>>
```

❶

❷

- ❶ The wrong password is entered. The system remains in secure mode.
- ❷ The password is successfully cleared.

The **clear password** command is used to exit secure mode and return to user mode. To use **clear password**, you must know the current password. Once you clear the password, the console is no longer secure.

To clear the password without knowing the current password, you must use the **login** command in conjunction with the Halt button, as described in Section 5.19.4.

5.20 Setting and Viewing Environment Variables

Use the **set *envvar*** and **show *envvar*** commands to set and view environment variables.

Example 5-23 Set *envvar* and Show *envvar*

```
P00>>> set bootdef_dev dkb0
P00>>> show bootdef_dev
Bootdef_dev dkb0
```

Environment variables pass configuration information between the console and the operating system. Their settings determine how the system powers up, boots the operating system, and operates. Environment variables are set or changed with the **set *envvar*** command. Their values are viewed with the **show *envvar*** command. You can also create nonvolatile environment variables with the **edit** command, as shown in Example 5-24.

Example 5-24 User-Created Environment Variable

```
P00>>> edit nvram
editing 'nvram'
0 bytes read in
*10 set mopv3_boot 1
*exit
17 bytes written out to nvram
P00>>>
```

In this example the nvram script is edited so that an environment variable called **mop3_boot** is created and set to 1 on each power-up. By default, MOP boots send four MOP V4 requests before defaulting to MOP V3. This user-created environment variable forces the SRM console to bypass MOP V4 requests. This speeds up MOP booting on networks with MOP V3 software.

set *envvar*

The **set** command sets or modifies the value of an environment variable. It can also be used to create a new environment variable if the name used is unique. Environment variables pass configuration information between the console and the operating system. Their settings determine how the system powers up, boots the operating system, and operates. The syntax is:

set [-default] *envvar value*

-default Restores an environment variable to its default setting.

envvar The name of the environment variable to be modified. See Table 5–6 for a list of environment variables

value The new value of the environment variable.

New values for the following environment variables take effect only after you reset the system by pressing the Reset button or by issuing the **init** command.

console
os_type
pk*0_fast
pk*0_host_id
pk*0_soft_term

show *envvar*

The **show *envvar*** command displays the current value (or setting) of an environment variable. The syntax is:

show *envvar*

envvar The name of the environment variable to be displayed. The **show *** command displays all environment variables.

Table 5–6 summarizes the most commonly used SRM environment variables. These environment variables are described in the following pages.

NOTE: *The environment variables for setting boot options are described in Chapter 3, Booting and Installing an Operating System.*

Table 5–6 Environment Variable Summary

Environment Variable	Function
auto_action	Specifies the console's action at power-up, a failure, or a reset.
bootdef_dev	Specifies the default boot device string.
boot_file	Specifies a default file name to be used for booting when no file name is specified by the boot command.
boot_osflags	Specifies the default operating system boot flags.
com1_baud	Sets the baud rate of the internal COM1 serial interface.
com2_baud	Sets the default baud rate of the COM2 serial port.
console	Specifies the device on which power-up output is displayed (serial terminal or VGA monitor).
cpu_enabled	Enables or disables a specific secondary CPU.
eg*0_mode ei*0_mode ew*0_mode	Specifies the connection type of the default Ethernet controller.
eg*0_protocols ei*0_protocols ew*0_protocols	Specifies network protocols for booting over the Ethernet controller.

Table 5–6 Environment Variable Summary (Continued)

Environment Variable	Function
kbd_hardware_type	Specifies the default console keyboard type.
language	Specifies the console keyboard layout.
os_type	Specifies the operating system and sets the appropriate console interface.
password	Sets a console password. Required for placing the SRM into secure mode.
pci_parity	Disables or enables parity checking on the PCI bus.
pk*0_fast	Enables fast SCSI mode.
pk*0_host_id	Specifies the default value for a controller host bus node ID.
pk*0_soft_term	Enables or disables SCSI terminators on systems that use the QLogic ISP1020 SCSI controller.
tt_allow_login	Enables or disables login to the SRM console firmware on other console ports.

5.20.1 com*_baud

The default baud rate for the system is 9600. The com*_baud commands set the baud rate for COM1 and COM2.

com1_baud

The **com1_baud** environment variable sets the baud rate for the internal COM1 serial interface.

com2_baud

The **com2_baud** environment variable sets the baud rate to match that of the device connected to the COM2 port.

The syntax is:

set com*_baud *baud_value*

baud_value The new baud rate. A list of possible values is displayed by entering the command without a value.

Example

The following example shows the supported baud rate values.

```
P00>>> set com2_baud
57600
38400
19200
9600
7200
4800
3600
2400
2000
1800
.
.
.
```

5.20.2 console

The console terminal can be either a VGA monitor or a serial terminal. The console environment variable specifies which type of console is used.

The syntax is:

set console *output_device*

The options for *output_device* are:

graphics (default) The console terminal is a VGA monitor or a device connected to the VGA port.

serial The console terminal is the device connected to the COM1 port.

The value of **console** takes effect only after you reset the system by pressing the Reset button or by issuing the **init** command.

Example

```
P00>>> show console
console          graphics
P00>>> set console serial
P00>>> init
.
.
.
P00>>> show console
console          serial
P00>>>
```

5.20.3 cpu_enabled

The `cpu_enabled` environment variable sets a bit mask that enables or disables specific CPUs in a multiprocessor system.

Disabling a CPU may be necessary if a number of errors are reported on a specific CPU. These errors might be displayed during power-up or might be displayed with the **show config** command.

Disabled CPUs are prevented from running the console or the operating system. Bit 0 of the mask corresponds to CPU 0 and bit 1 to CPU 1. A zero (0) in the bit mask prevents the corresponding CPU from running; a one (1) allows it to run. The bit mask is expressed as a hexadecimal value.

The value of **cpu_enabled** takes effect only after you reset the system by pressing the Reset button or by issuing the **init** command.

The **cpu_enabled** environment variable is typically used in benchmark testing.

NOTE: *The primary CPU cannot be disabled. The primary CPU is the lowest numbered working CPU.*

The syntax is:

set cpu_enabled *hex_digit*

The *hex_digit* values are shown in the table.

Hex_Digit Value	Binary Equivalent	
	CPU enable 3210 (bit)	Enabled CPUs
0	0000	No CPUs (CPU 0 still comes up)
1	0001	CPU 0
2	0010	CPU 1
3	0011	CPU 0,1

Example

In the following example, CPU 0 and CPU 1 are enabled.

```
P00>>> set cpu_enabled 3
```

5.20.4 eg*0_mode or ei*0_mode or ew*0_mode

The **eg*0_mode** or **ei*0_mode** or **ew*0_mode** environment variable sets an Ethernet controller to run an AUI, ThinWire, or twisted-pair Ethernet network. For the fast setting, the device defaults to fast.

To list the network devices on your system, enter the **show device** command. The Ethernet controllers start with the letters “eg”, “ei,” or “ew,” for example, ewa0. The third letter is the adapter ID for the specific Ethernet controller. Replace the asterisk (*) with the adapter ID letter when entering the command.

The syntax is:

set eg*0_mode *value* or
set ei*0_mode *value* or
set ew*0_mode *value*

The options for ei*_mode and ew*_mode *value* are:

au	Device type is AUI.
bn	Device type is ThinWire.
fa	Device type is fast 100BaseT.
Fastfd	Device type is fast full duplex 100BaseT.
fu	Device type is full duplex twisted-pair.
twisted-pair	Device type is 10BaseT (twisted-pair).

Example

```
P00>>> set ewa0_mode
P00>>> show ewa0_mode
ewa0_mode          twisted-pair
```

The options for eg*_mode *value* are:

auto	Auto negotiate
10mbps	10 Mb half duplex
10mbps_full_duplex	10 Mb full duplex
100mbps	100 Mb half duplex
100mbps_full_duplex	100 Mb full duplex
1000mbps	1000 Mb half duplex
1000mbps_full_duplex	1000 Mb full duplex

5.20.5 kbd_hardware_type

The **kbd_hardware_type** environment variable sets the keyboard hardware type as either PCXAL or LK411 and enables the system to interpret the terminal keyboard layout correctly.

The syntax is:

set kbd_hardware_type *keyboard_type*

The options for *keyboard_type* are:

pcxal (default) Selects the 102-type keyboard layout.

lk411 Selects the LK411 keyboard layout.

Example

```
P00>>> set kbd_hardware_type lk411
P00>>>
```

5.20.6 language

The language environment variable specifies the keyboard layout, which depends on the language. The setting of the language environment variable must match the language of the keyboard variant.

The factory keyboard setting is 36 English (American).

The value of **language** takes effect only after you reset the system by pressing the Reset button or issuing the **init** command.

The syntax is:

set language *language_code*

The options for *language_code* are:

0	No language	42	Italiano (Italian)
30	Dansk (Danish)	44	Nederlands (Netherlands)
32	Deutsch (German)	46	Norsk (Norwegian)
34	Deutsch (Swiss)	48	Portugues (Portuguese)
36	English (American)	4A	Suomi (Finnish)
38	English (British/Irish)	4C	Svenska (Swedish)
3A	Español (Spanish)	4E	Belgisch-Nederlands (Dutch)
3C	Français (French)	50	Japanese (JIS)
3E	Français (Canadian)	52	Japanese (ANSI)
40	Français (Suisse Romande)		

Example

```
P00>>> set language 3A
```

5.20.7 os_type

The `os_type` environment variable specifies the default operating system. This variable is set at the factory to the setting for the operating system you purchased. Use this command to change the factory default setting.

The value of **os_type** takes effect only after you reset the system by pressing the Reset button or by issuing the **init** command.

The syntax is:

set os_type *os_type*

The options for *os_type* are:

- | | |
|----------------|---|
| unix | Sets the default to <i>Tru64 UNIX</i> . The SRM firmware is started during power-up or reset. |
| OpenVMS | Sets the default to <i>OpenVMS</i> . The SRM firmware is started during power-up or reset. |
| OSF | Sets the default to <i>Tru64 UNIX</i> . The SRM firmware is started during power-up or reset. |
| Linux | Sets the default to Linux. The SRM firmware is started during power-up or reset. |

Example

In this example, the default operating system is set to *Tru64 UNIX*. After the system is initialized, the *Tru64 UNIX* banner is displayed.

```
P00>>> set os_type unix
P00>>> init
.
.
.
```

5.20.8 pci_parity

The `pci_parity` environment variable disables or enables parity checking on the PCI bus.

Some PCI devices do not implement PCI parity checking, and some have a parity-generating scheme in which the parity is sometimes incorrect or is not fully compliant with the PCI specification. A side effect of this behavior is that superfluous PCI parity errors are reported by the host PCI bridge. In such cases, the device can be used as long as parity is not checked.

CAUTION: *Disabling PCI parity checking on this system is not recommended or supported.*

The syntax is:

set pci_parity *value*

The options for *value* are:

on (default) Enables PCI parity checking.

off Disables PCI parity checking.

Example

```
P00>>> show pci_parity
pci parity          on
```

5.20.9 pk*0_fast

The pk*0_fast environment variable enables fast SCSI to perform in either standard or fast mode.

If the system has at least one fast SCSI device, set the default controller speed to fast SCSI (1). Devices on a controller that connects to both standard and fast SCSI devices will perform at the appropriate rate for the device. If the system has no fast SCSI devices, set the default controller speed to standard SCSI (0). If a fast SCSI device is on a controller set to standard, it will perform in standard mode.

To list the controllers on your system, enter the **show device** command. SCSI controllers begin with the letters “pk,” for example, pka0. The third letter is the adapter ID for the specific SCSI controller. Replace the asterisk with the adapter ID letter when entering the **set pk*0_fast** command.

The value of **set pk*0_fast** takes effect only after you reset the system by pressing the Reset button or by issuing the **init** command.

The syntax is:

set pk*0_fast *scsi_speed*

The options for *scsi_speed* are:

- 0** The controller is in standard SCSI mode.
- 1 (default)** The controller is in fast SCSI mode.

Example

```
P00>>> set pkb0_fast 1
P00>>> init
.
.
.
P00>>> show pkb0_fast
P00>>> pkb0_fast      1
```

5.20.10 pk*0_host_id

The `pk*0_host_id` environment variable sets the controller host bus node ID to a value between 0 and 7.

Each SCSI bus in the system requires a controller. Buses can support up to eight devices; however, the eighth device must be a controller. Each device on the bus, including the controller, must have a unique ID, which is a number between 0 and 7. This is the bus node ID number.

On each bus, the default bus node ID for the controller is set to 7. You do not need to change the controller bus node ID unless you have two or more controllers on the same bus.

To list the controllers on your system, enter the **show device** command. SCSI controllers begin with the letters “pk” (for example, pka0). The third letter is the adapter ID for the controller. Replace the asterisk with the adapter ID letter when entering the **set pk*0_host_id** command.

The value of **pk*0_host_id** takes effect only after you reset the system by pressing the Reset button or by issuing the **init** command.

The syntax is:

set pk*_host_id *scsi_node_id*

The value for *scsi_node_id* is the bus node ID, a number from 0 to 7.

Example

In this example, the default bus node ID for a SCSI controller with an adapter ID of “b” is set to bus node ID 6.

```
P00>>> set pkb0_host_id 6
P00>>> init
.
.
.
P00>>> show pkb0_host_id
pkb0_host_id          6
```

5.20.11 pk*0_soft_term

The pk*0_soft_term environment variable enables or disables SCSI terminators for optional SCSI controllers. This environment variable applies to systems that use the QLogic SCSI controller, though it does not affect the onboard controller.

The QLogic ISP1020 SCSI controller implements the 16-bit wide SCSI bus. The QLogic module has two terminators, one for the low eight bits and one for the high eight bits.

To list the controllers on your system, enter the **show device** command. SCSI controllers begin with the letters “pk” (for example, pka0). The third letter is the adapter ID for the controller. Replace the asterisk with the adapter ID letter when entering the **set pk*0_soft_term** command.

The value of **pk*0_soft_term** takes effect only after you reset the system by pressing the Reset button or by issuing the **init** command.

The syntax is:

set pk*0_soft_term *value*

The options for *value* are:

- | | |
|---------------------|--|
| off | Disables termination of all 16 bits. |
| low | Enables low eight bits and disables high eight bits. |
| high | Enables high eight bits and disables low eight bits. |
| on (default) | Enables all 16 bits. |

Examples

In this example, both terminators are disabled.

```
P00>>> set pkb0_soft_term off
P00>>> init
.
.
.
P00>>> show pkb0_soft_term
pkb0_soft_term          off
```

In this example, the terminator for the high 8 bits is enabled.

```
P00>>> set pkb0_soft_term high
P00>>> init
.
.
.
P00>>> show pkb0_soft_term
pkb0_soft_term          high
```

5.20.12 tt_allow_login

The **tt_allow_login** environment variable enables or disables login to the SRM console firmware on alternative console ports. “Login” refers to pressing the Return or Enter key to activate the console device.

If the **console** environment variable is set to **serial**, the primary console device is the terminal connected through the COM1 port. The **set tt_allow_login 1** command lets you activate a console device through COM2 or a VGA monitor. The **set tt_allow_login 0** command disables console activation through alternative ports. You might want to disable console access to COM2 as a system security measure or if you want to use COM2 as an “application only” port.

The syntax is:

set tt_allow_login *value*

The options for *value* are:

- 0** Disables login through the COM2 port or the VGA monitor.
- 1 (default)** Enables login through the COM2 port or the VGA monitor.

Example

In the following example, the primary console device is set to the terminal connected through the COM1 port. Then the **set tt_allow_login 0** command is used to disable logins through either the COM2 port or a VGA monitor.

```
P00>>> set console serial
P00>>> init
.
.
.
P00>>> set tt_allow_login 0
```


Chapter 6

Remote Management

You can manage the system through the remote management console (RMC). The RMC is implemented through an independent microprocessor that resides on the system board. The RMC also provides configuration and error log functionality.

This chapter explains the operation and use of the RMC. Sections are:

- RMC Overview
- Operating Modes
- Terminal Setup
- SRM Environment Variables for COM1
- Entering the RMC
- Using the Command-Line Interface
- Resetting the RMC to Factory Defaults
- RMC Command Reference
- Troubleshooting Tips

6.1 RMC Overview

The remote management console provides a mechanism for monitoring the system (voltages, temperatures, and fans) and manipulating it on a low level (reset, power on/off, halt).

The RMC performs monitoring and control functions to ensure the successful operation of the system.

- Monitors thermal sensors on the CPUs, the system motherboard, and the power supplies
- Monitors voltages, power supplies, and fans
- Handles swapping of hot-plug power supplies and fans
- Controls the operator control panel (OCP) and status can be interpreted from the OCP LEDs.
- Detects alert conditions such as excessive temperature, fan failure, and power supply failure. On detection, pages an operator, and sends an interrupt to SRM, which then passes the interrupt to the operating system or an application.
- Shuts down the system if any fatal conditions exist. For example:
 - The temperature reaches the failure limit.
 - The cover to the system card cage is left off too long.
 - Both system fans or any CPU fan fails.
- Retrieves and passes information about a system shutdown to SRM at the next power-up. SRM displays a message regarding the last shutdown.
- Provides a command-line interface (CLI) for the user to control the system. From the CLI you can power the system on and off, halt or reset the system, and monitor the system environment.
- Passes error log information to shared RAM so that this information can be accessed by the system.

The RMC logic is implemented using an 8-bit microprocessor, PIC17C44, as the primary control device. The firmware code resides on the microprocessor and in flash memory. If the RMC firmware should ever become corrupted or obsolete, you can update it manually using the Loadable Firmware Update Utility. See Chapters 2 and 4 for details. The microprocessor can also communicate with the system power control logic to turn on or turn off power to the rest of the system.

The RMC is powered by an auxiliary 5V supply. You can gain access to the RMC as long as AC power is available to the system (through the wall outlet). Thus, if the system fails, you can still access the RMC and gather information about the failure.

Configuration, Error Log, and Asset Information

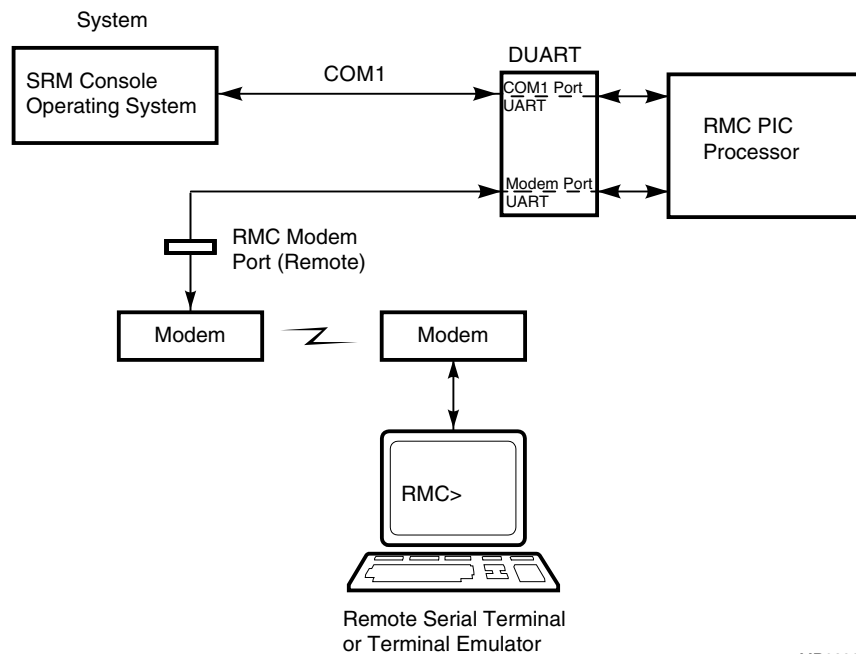
The RMC provides additional functionality to read and write configuration and error log information to FRU error log devices. These operations are carried out via shared RAM (also called dual-port RAM or DPR).

At power-on, the RMC reads the EEPROMs in the system and dumps the contents into the DPR. These EEPROMs contain configuration information, asset inventory and revision information, and error logs. During power-up the SROM sends status and error information for each CPU to the DPR. The system also writes error log information to the DPR when an error occurs. Service providers can access the contents of the DPR to diagnose system problems.

6.2 Operating Modes

The RMC can be configured to manage different data flow paths defined by the `com1_mode` environment variable. In Through mode (the default), all data and control signals flow from the system COM1 port through the RMC to the active external port. You can also set bypass modes so that the signals partially or completely bypass the RMC. The `com1_mode` environment variable can be set from either SRM or the RMC. See Section 6.8.

Figure 6-1 Data Flow in Through Mode



MR0390

Through Mode

Through mode is the default operating mode. The RMC routes every character of data between the internal system COM1 port and the active external port, or the 9-pin modem port. If a modem is connected, the data goes to the modem. The RMC filters the data for a specific escape sequence. If it detects the escape sequence, it enters the RMC CLI.

Figure 6–1 illustrates the data flow in Through mode. The internal system COM1 port is connected to one port of the DUART chip, and the other port is connected to a 9-pin external modem port, providing full modem controls. The DUART is controlled by the RMC microprocessor, which moves characters between the two UART ports. The escape sequence signals the RMC to enter the CLI. Data issued from the CLI is transmitted between the RMC microprocessor and the active port that enters the RMC.

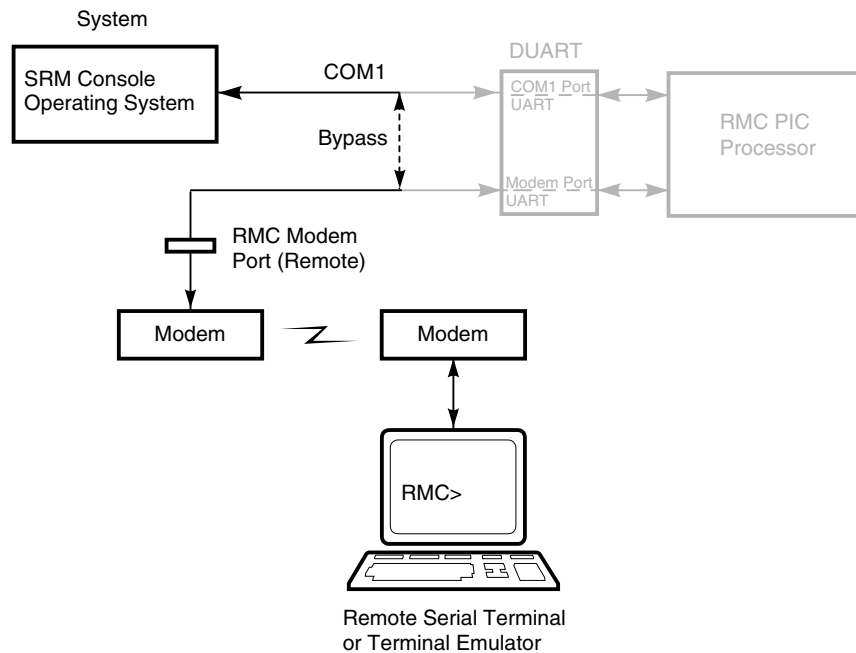
In through mode, the RMC also outputs its powerup messages as well as fatal errors through the COM1 port.

NOTE: *The internal system COM1 port should not be confused with the external COM1 serial port on the back of the system. The internal COM1 port is used by the system software to send data either to the COM1 port on the system or to the RMC modem port if a modem is connected.*

6.2.1 Bypass Modes

For modem connection, you can set the operating mode so that data and control signals partially or completely bypass the RMC. The bypass modes are Snoop, Soft Bypass, and Firm Bypass.

Figure 6-2 Data Flow in Bypass Mode



MR0391

Figure 6–2 shows the data flow in the bypass modes. Note that the internal system COM1 port is connected directly to the modem port.

NOTE: *You can connect a serial terminal to the modem port in any of the bypass modes.*

Snoop Mode

In Snoop mode data partially bypasses the RMC. The data and control signals are routed directly between the system COM1 port and the external modem port, but the RMC taps into the data lines and listens passively for the RMC escape sequence. If it detects the escape sequence, it enters the RMC CLI.

The escape sequence is also passed to the system on the bypassed data lines. If you decide to change the default escape sequence, be sure to choose a unique sequence so that the system software does not interpret characters intended for the RMC.

In Snoop mode the RMC is responsible for configuring the modem for dial-in as well as dial-out alerts and for monitoring the modem connectivity.

Because data passes directly between the two UART ports, Snoop mode is useful when you want to monitor the system but also ensure optimum COM1 performance.

Soft Bypass Mode

In Soft Bypass mode all data and control signals are routed directly between the system COM1 port and the external modem port, and the RMC does not listen to the traffic on the COM1 data lines. The RMC is responsible for configuring the modem and monitoring the modem connectivity. If the RMC detects loss of carrier or the system loses power, it switches automatically into Snoop mode. If you have set up the dial-out alert feature, the RMC pages the operator if an alert is detected and the modem line is not in use.

Soft Bypass mode is useful if management applications need the COM1 channel to perform a binary download, because it ensures that RMC does not accidentally interpret some binary data as the escape sequence.

After downloading binary files, you can set the **com1_mode** environment variable from the SRM console to switch back to Snoop mode or other modes for accessing the RMC, or you can hang up the current modem session and reconnect it.

Firm Bypass Mode

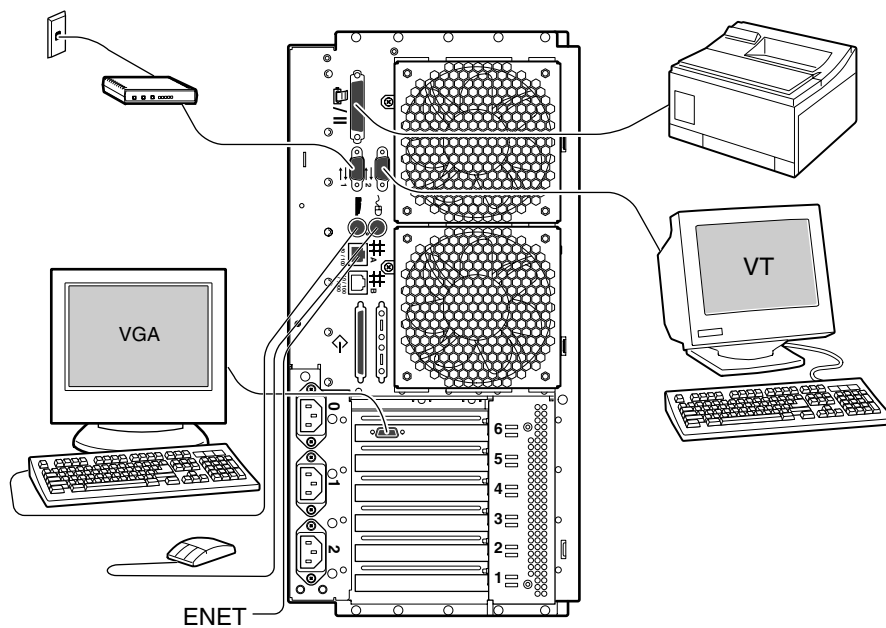
In Firm Bypass mode all data and control signals are routed directly between the system COM1 port and the external modem port. The RMC does not configure or monitor the modem. Firm Bypass mode is useful if you want the system, not the RMC, to fully control the modem port and you want to disable RMC remote management features such as remote dial-in and dial-out alert.

You can switch to other modes by resetting the **com1_mode** environment variable from the SRM console, but you must set up the RMC again from the local terminal.

6.3 Terminal Setup

To set up the RMC to monitor a system remotely, connect the modem to the COM1 port at the back of the system; then configure the modem port for dial-in.

Figure 6-3 Setup for RMC



MR0314

6.4 SRM Environment Variables for COM1

Several SRM environment variables allow you to set up the COM1 serial port (MMJ) for use with the RMC.

You may need to set the following environment variables from the SRM console, depending on how you decide to set up the RMC.

com1_baud	Sets the baud rate of the COM1 serial port and the modem port. The default is 9600. See Chapter 5.
com1_flow	Specifies the flow control on the serial port. The default is software . See Chapter 5.
com1_mode	Specifies the COM1 data flow paths so that data either flows through the RMC or bypasses it. This environment variable can be set from either the SRM or the RMC. See Section 6.8.
com1_modem	Specifies to the operating system whether or not a modem is present. See Chapter 5.

6.5 Entering the RMC

You type an escape sequence to invoke the RMC. You can enter RMC from any of the following: a modem, the local serial console terminal, the local VGA monitor, or the system. The “system” includes the operating system, SRM, or an application.

- You can enter the RMC from the COM1 terminal regardless of the current operating mode.
 - You can enter the RMC from the modem if the RMC is in Through mode or Snoop mode. In Snoop mode the escape sequence is passed to the system and displayed.
-

NOTE: *Only one RMC session can be active at a time.*

Entering from a Serial Terminal

Invoke the RMC from a serial terminal by typing the following default escape sequence:

```
^[^[ rmc
```

This sequence is equivalent to typing Ctrl/left bracket, Ctrl/left bracket, rmc. On some keyboards, the Esc key functions like the Ctrl/left bracket combination.

To exit, enter the **quit** command. This action returns you to whatever you were doing before you invoked the RMC. In the following example, the **quit** command returns you to the system COM1 port.

```
RMC> quit
Returning to COM port
```

Entering from the Local VGA Monitor

To enter the RMC from the local VGA monitor, the **console** environment variable must be set to **graphics**.

Invoke the SRM console and enter the **rmc** command.

```
P00>>>set Com1_mode through
```

```
P00>>> rmc
```

You are about to connect to the Remote Management Console.

Use the RMC reset command or press the front panel reset button to disconnect and to reload the SRM console.

Do you really want to continue? [y/(n)] y

Please enter the escape sequence to connect to the Remote Management Console.

After you enter the escape sequence, the system enters the CLI and the RMC> prompt is displayed.

When the RMC session is completed, reset the system with the Reset button on the operator control panel or issue the RMC **reset** command.

```
RMC> reset
```

```
Returning to COM port
```

6.6 Using the Command-Line Interface

The remote management console supports setup commands and commands for managing the system. For detailed descriptions of the RMC commands, see Section 6.8.

Command Conventions

Observe the following conventions for entering RMC commands:

- Enter enough characters to distinguish the command.

NOTE: *The **reset** and **quit** commands are exceptions. You must enter the entire string for these commands to work.*

- For commands consisting of two words, enter the entire first word and at least one letter of the second word. For example, you can enter **disable a** for **disable alert**.
- For commands that have parameters, you are prompted for the parameter.
- Use the Backspace key to erase input.
- If you enter a nonexistent command or a command that does not follow conventions, the following message is displayed:

```
*** ERROR - unknown command ***
```

- If you enter a string that exceeds 14 characters, the following message is displayed:

```
*** ERROR - overflow ***
```

- Use the Backspace key to erase input.

6.6.1 Displaying the System Status

The RMC status command displays the system status and the current RMC settings. Table 6–1 explains the status fields. See Section 6.8 for information on the commands used to set the status fields.

```
RMC> status
```

```
PLATFORM STATUS
On-Chip Firmware Revision: V1.0
Flash Firmware Revision: V1.1
Server Power: ON
System Halt: Deasserted
RMC Power Control: ON
Escape Sequence: ^^[RMC
Remote Access: Disabled
RMC Password: set
Alert Enable: Disabled
Alert Pending:
Init String:
Dial String:
Alert String:
Com1_mode: THROUGH
Last Alert: System Unplugged or AC loss
Logout Timer: 20 minutes
User String:
```

```
RMC>
```

Table 6-1 Status Command Fields

Field	Meaning
On-Chip Firmware Revision:	Revision of RMC firmware on the microcontroller.
Flash Firmware Revision:	Revision of RMC firmware in flash ROM.
Server Power:	ON = System is on. OFF = System is off.
System Halt:	Asserted = System has been halted. Deasserted = Halt has been released.
RMC Power Control:	ON= System has powered on from RMC. OFF = System has powered off from RMC.
Escape Sequence:	Current escape sequence for access to RMC console.
Remote Access:	Enabled = Modem for remote access is enabled. Disabled = Modem for remote access is disabled.
RMC Password:	Set = Password set for modem access. Not set = No password set for modem access.
Alert Enable:	Enabled = Dial-out enabled for sending alerts. Disabled = Dial-out disabled for sending alerts.
Alert Pending:	YES = Alert has been triggered. NO = No alert has been triggered.
Init String:	Initialization string that was set for modem.
Dial String:	Pager string to be dialed when an alert occurs.
Alert String:	Identifies the system that triggered the alert to the paging service. Usually the phone number of the monitored system.
Com1_mode:	Identifies the current COM1 mode.
Last Alert:	Type of alert (for example, Fan 1 failed).
Logout Timer:	The amount of time before the RMC terminates an inactive modem connection. The default is 20 minutes.
User String:	Notes supplied by user.

6.6.2 Displaying the System Environment

The RMC env command provides a snapshot of the system environment.

```
RMC> env
```

```
System Hardware Monitor

System Temperatures (warnings at 50.00C, power-off at 55.00C) ❶
  CPU0: 29.00C°    CPU1: 33.00C°
  Zone0: 34.00C°    Zone1: 33.00C°    Zone2: 29.00C°
Fan RPMs ❷
  Sys Fan0: 2428    Sys Fan1: 2428    PCI Fan: 1695 ❸
  CPU0 Fan: 3590    CPU1 Fan: 3629
Power Supply(OK, FAIL, OFF, '----' means not present) ❹
  PS0 : OK    PS1 : OK    PS2 : OK
  CPU0: OK    CPU1: OK
CPU CORE voltage
  CPU0: +1.650V    CPU1: +1.640V ❺
CPU IO voltage
  CPU0: +1.650V    CPU1: +1.640V
CPU CACHE voltage
  CPU0: +2.548V    CPU1: +2.522V
Bulk voltage
  +3.3V Bulk: +3.326V    +5V Bulk: +5.255V    +12V Bulk: +12.160V ❻
  Vterm: +1.600V    Cterm: +1.600V    -12V Bulk: -12.537V
  +2.5V Bulk: +2.457V
RMC>
```

- ❶ CPU temperature.
- ❷ Zone 0, 1, and 2 measure the temperature of the PCI compartment and are reported from three thermal sensors located in different areas of the back-plane.
- ❸ Fan RPM (system fans, CPU fans, and PCI fan).
- ❹ The normal power supply status is either OK (system is powered on) or OFF (system is powered off or the power supply cord is not plugged in). FAIL indicates a problem with a supply.
- ❺ CPU CORE voltage, CPU I/O voltage, and CPU cache voltage. In a healthy system, all CPUs should have the same core voltage, the same I/O voltage, and the same cache voltage.
- ❻ Bulk power supply voltage.

6.6.3 Using Power On and Off, Reset, and Halt Functions

The RMC **power {on, off}**, **halt {in, out}**, and **reset** commands perform the same functions as the buttons on the operator control panel.

Power On and Power Off

The RMC **power on** command powers the system on, and the **power off** command powers the system off. The Power button on the OCP, however, has precedence.

- If the system has been powered off with the Power button, the RMC cannot power the system on. If you enter the **power on** command, the message “Power button is OFF” is displayed, indicating that the command will have no effect.
- If the system has been powered on with the Power button, and the **power off** command is used to turn the system off, you can toggle the Power button to power the system back on.

When you issue the **power on** command, the terminal exits RMC and reconnects to the server’s COM1 port.

```
RMC> power on
Returning to COM port
RMC> power off
```

Halt In and Halt Out

The **halt in** command halts the system. The **halt out** command releases the halt. When you issue either the **halt in** or **halt out** command, the terminal exits RMC and reconnects to the server's COM1 port.

```
RMC> halt in
Returning to COM port
RMC> halt out
Returning to COM port
```

The **halt out** command cannot release the halt if the Halt button is latched in. If you enter the **halt out** command, the message “Halt button is IN” is displayed, indicating that the command will have no effect. Toggling the Power button on the operator control panel overrides the **halt in** condition.

Reset

The RMC **reset** command restarts the system. The terminal exits RMC and reconnects to the server's COM1 port.

```
RMC> reset
Returning to COM port
```

6.6.4 Configuring Remote Dial-In

Before you can dial in through the RMC modem port or enable the system to call out in response to system alerts, you must configure RMC for remote dial-in.

Connect your modem to the 9-pin modem port and turn it on. Enter the RMC from either the Com1 serial terminal or the local VGA monitor to set up the parameters.

NOTE: *Com1_mode must be in either Snoop or Through to start the Dial-In Configuration.*

Example 6-1 Dial-In Configuration

RMC> set password	❶
RMC Password: ****	
Verification: ****	
RMC> set init	❷
Init String: at&f0e0v0x0c1s0=2	
RMC> enable remote	❸
RMC> status	❹
.	
.	
.	
Remote Access: Enabled	
.	
.	
.	

- ❶ Sets the password that is prompted for at the beginning of a modem session. The string cannot exceed 14 characters and is not case sensitive. For security, the password is not echoed on the screen. When prompted for verification, type the password again.
- ❷ Sets the initialization string. The string is limited to 31 characters and can be modified depending on the type of modem used. Because the modem commands disallow mixed cases, the RMC automatically converts all alphabetic characters entered in the init string to uppercase.

The RMC automatically configures the modem's flow control according to the setting of the SRM **com1_flow** environment variable. The RMC also enables the modem carrier detect feature to monitor the modem connectivity.

- ❸ Enables remote access to the RMC modem port by configuring the modem with the setting stored in the initialization string.
- ❹ Verifies the settings. Check that the Remote Access field is set to Enabled.

Note: Once the RMC is configured, disconnect the serial line from COM1 and connect to the modem

Dialing In

The following example shows the screen output when a modem connection is established.

```
ATDT915085553333
(Model in process of connecting)
CONNECT 9600/ARQ/V32/LAPM
RMC Password: *****
Welcome to RMC V1.2
P00>>> ^[^[rmc
DS25 RMC V1.2
RMC>
```

1. At the RMC> prompt, enter commands to monitor and control the remote system.
2. When you have finished a modem session, enter the **hangup** command to cleanly terminate the session and disconnect from the server.

6.6.5 Configuring Dial-Out Alert

When you are not monitoring the system from a modem connection, you can use the RMC dial-out alert feature to remain informed of system status. If dial-out alert is enabled, and the RMC detects alarm conditions within the managed system, it can call a preset pager number.

You must configure remote dial-in for the dial-out feature to be enabled. See Section 6.6.4.

To set up the dial-out alert feature, enter the RMC from the COM1 serial terminal or local VGA monitor.

Example 6-2 Dial-Out Alert Configuration

```
RMC> set dial                                ❶
Dial String: ATXDT9,15085553333
RMC> set alert                                ❷
Alert String: ,,,,,,5085553332#;
RMC> enable alert                             ❸
RMC> clear alert                             ❹
RMC> send alert                              ❺
Alert detected!
RMC> clear alert                             ❻
RMC> status                                  ❼
.
Alert Enable: Enabled
.
```

A typical alert situation might be as follows:

- The RMC detects an alarm condition, such as over temperature warning.
- The RMC dials your pager and sends a message identifying the system.
- You dial the system from a remote serial terminal.
- You enter the RMC, check system status with the **env** command, and, if the situation requires, power down the managed system.
- When the problem is resolved, you power up and reboot the system.

The elements of the dial string and alert string are shown in Table 6–2. Paging services vary, so you need to become familiar with the options provided by the paging service you will be using. The RMC supports only numeric messages.

- ❶ Sets the string to be used by the RMC to dial out when an alert condition occurs. The dial string must include the appropriate modem commands to dial the number.
- ❷ Sets the alert string, typically the phone number of the modem connected to the remote system. The alert string is appended after the dial string, and the combined string is sent to the modem when an alert condition is detected.
- ❸ Enables the RMC to page a remote system operator.
- ❹ Clears any alert that may be pending. This ensures that the **send alert** command will generate an alert condition.
- ❺ Forces an alert condition. This command is used to test the setup of the dial-out alert function. It should be issued from the local serial terminal or local VGA monitor. As long as no one connects to the modem and there is no alert pending, the alert will be sent to the pager immediately. If the pager does not receive the alert, re-check your setup.
- ❻ Clears the current alert so that the RMC can capture a new alert. The last alert is stored until a new event overwrites it. The Alert Pending field of the **status** command becomes NO after the alert is cleared.
- ❼ Verifies the settings. Check that the Alert Enable field is set to Enabled.

NOTE: *If you do not want dial-out paging enabled at this time, enter the **disable alert** command after you have tested the dial-out alert function. Alerts continue to be logged, but no paging occurs.*

Continued on next page

Table 6-2 Elements of Dial String and Alert String

Dial String	
	The dial string is case sensitive. The RMC automatically converts all alphabetic characters to uppercase.
ATXDT	AT = Attention. X = Forces the modem to dial “blindly” (not seek the dial tone). Enter this character if the dial-out line modifies its dial tone when used for services such as voice mail. D = Dial T = Tone (for touch-tone)
9,	The number for an outside line (in this example, 9). Enter the number for an outside line if your system requires it. , = Pause for 2 seconds.
15085553333	Phone number of the paging service.
Alert String	
,,,,,	Each comma (,) provides a 2-second delay. In this example, a delay of 12 seconds is set to allow the paging service to answer.
5085553332#	A call-back number for the paging service. The alert string must be terminated by the pound (#) character.
;	A semicolon (;) must be used to terminate the entire string.

6.7 Resetting the RMC to Factory Defaults

If the non-default RMC escape sequence has been lost or forgotten, RMC must be reset to factory settings to restore the default escape sequence.



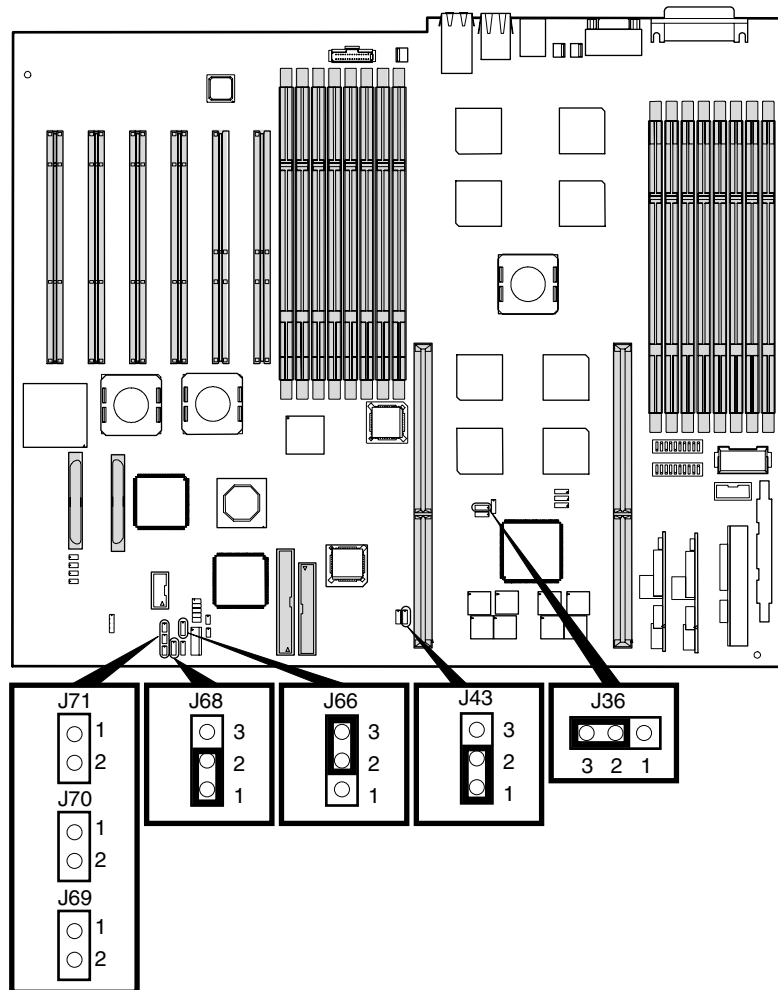
WARNING: To prevent injury, access is limited to persons who have appropriate technical training and experience. Such persons are expected to understand the hazards of working within this equipment and take measures to minimize danger to themselves or others.

The following procedure restores the default settings:

1. Shut down the operating system and press the Power button on the operator control panel to the OFF position.
2. Unplug the power cord from each power supply. Wait several seconds before proceeding.
3. Remove enclosure panels as described in Chapter 4.
4. Remove the system card cage cover and fan cover from the system chassis, as described in Chapter 4.
5. Remove CPU1 as described in Chapter 4.

6. On the system board, install the following jumpers for default mode (see Figure 6–4 for locations).
 - a) Install jumper J36 over pins 3 and 2 (RMC flash ROM Write Enable).
 - b) Install jumper J43 over pins 2 and 1 (Temperature Fail System Shutdown Disable).
 - c) Install jumper J66 over pins 3 and 2 (RMC Environmental Control).
 - d) Jumpers J69, J70, and J71 are not jumpered (RMC Features).
 - e) Install jumper J68 over pins 2 and 3 (selects COM1 mode).

Figure 6-4 RMC Jumpers (Default Positions)



MR0392A

7. Plug a power cord into one power supply, and then wait until the control panel displays the message “System is down.”
 8. Unplug the power cord and wait several seconds before proceeding.
 9. Reinstall CPU1, the card cage cover and fan cover and the enclosure panels.
 10. Plug the power cord into each of the power supplies.
-

NOTE: *After the RMC has been reset to defaults, perform the setup procedures to enable remote dial-in and call-out alerts. See Section 6.6.4.*

6.8 RMC Command Reference

This section describes the RMC command set. Commands are listed in alphabetical order.

clear {alert, port}
dep
disable {alert, remote}
dump
enable {alert, remote}
env
halt {in, out}
hangup
help or ?
power {on, off}
quit
reset
send alert
set {alert, com1_mode, dial, escape, init, logout, password, user}
status

NOTE: The **dep** and **dump** commands are reserved for service providers.

clear alert

The **clear alert** command clears the current alert condition and causes the RMC to stop paging the remote system operator.

If the alert is not cleared, the RMC continues to page the remote operator every 30 minutes if the dial-out alert feature is enabled.

The **clear alert** command clears the current alert so that the RMC can capture a new alert. The last alert is stored until a new event overwrites it. The Alert Pending field of the **status** command becomes NO after the alert is cleared.

```
RMC> clear alert
RMC>
```

clear port

The **clear port** command clears any “stuck” conditions on the system’s COM1 port.

The **clear port** command attempts to free the port by resetting all UARTs controlled by the RMC if the port is currently locked by an application program, without resetting the entire system.

```
RMC> clear port  
RMC>
```

NOTE: *This command also causes the modem to disconnect.*

disable alert

The **disable alert** command disables the RMC from paging a remote system operator.

Monitoring continues and alerts are still logged in the Last Alert field of the **status** command, but alerts are not sent to the remote operator.

```
RMC> disable alert  
RMC>
```

disable remote

The **disable remote** command disables remote access to the RMC modem port and disables automatic dial-out.

```
RMC> disable remote  
RMC>
```

enable alert

The **enable alert** command enables the RMC to page a remote system operator.

Before you can enter the **enable alert** command, you must configure remote dial-in and call-out, set an RMC password, and enable remote access to the RMC modem port. See Section 6.6.4 and Section 6.6.5.

```
RMC> set dial
Dial String: ATXDT9,15085553333
RMC> set alert
Alert String: ,,,,,,5085553332#;
RMC> enable alert
RMC>
```

If the **enable alert** command fails, the following error message is displayed:

```
*** ERROR - enable failed ***
```

Issue the **status** command to see if the Remote Access field is set to Enabled.

enable remote

The **enable remote** command enables remote access to the RMC modem port by configuring the modem with the setting stored in the initialization string.

This command also allows the RMC to automatically dial the pager number set with the **set dial** command upon detection of alert conditions.

Before you can enter the **enable remote** command, you must configure remote dial-in by setting an RMC password and initialization string. See Section 6.6.4.

```
RMC> set password
RMC Password: ****
Verification: ****
RMC> set init
Init String: AT&F0E0V0X0S0=2
RMC> enable remote
```

If the **enable remote** command fails, the following error message is displayed:

```
*** ERROR - enable failed ***
```

Check that the modem is connected and that you have set the initialization string correctly.

env

The **env** command displays the system environmental status, including power supplies, voltages, fans, and temperatures. If a fault has occurred, the reading blinks.

See Section 6.6.2 for details and an example.

halt in

The **halt in** command is equivalent to pressing the Halt button on the control panel.

The **halt in** command halts the managed system. When the **halt in** command is issued, the terminal exits RMC and returns to the server's COM1 port.

Toggling the Power button on the operator control panel overrides the **halt in** condition.

```
RMC> halt in
Returning to COM port
```

halt out

The **halt out** command is equivalent to releasing the Halt button on the control panel.

The **halt out** command releases a halt. The terminal exits RMC and returns to the server's COM1 port.

```
RMC> halt out
Returning to COM port
```

You cannot use **halt out** to release a halt if the Halt button on the operator control panel is latched in. If you issue the command, the following message is displayed:

```
RMC> halt out
Halt button is IN
```

hangup

The hangup command terminates the modem session.

If you do not issue the **hangup** command, the session is disconnected automatically after a period of idle time set by the **set logout** command. The default is 20 minutes.

```
RMC> hangup
RMC>
```

help or ?

The **help** or **?** command displays the RMC command set.

```
RMC> help
clear {alert, port}
deposit
disable {alert, remote}
dump
enable {alert, remote}
env
halt {in, out}
hangup
help or ?
power {off, on}
quit
reset
send alert
set {alert, com1_mode, dial, escape, init, logout, password, user}
status
```

power off

The **power off** command is equivalent to turning off the system power from the operator control panel.

If the system is already powered off, this command has no effect. You can override the **power off** command either by issuing a **power on** command or by toggling the Power button on the operator control panel.

```
RMC> power off
RMC - System is Down
RMC>
```

power on

The **power on** command is equivalent to turning on the system power from the operator control panel.

If the system is already powered on, this command has no effect. After the **power on** command is issued, the terminal exits RMC and reconnects to the server's COM1 port.

```
RMC> power on
Returning to COM port
```

The **power on** command does not turn on the system if the Power button on the operator control panel is in the Off position. If you issue the command, the following message is displayed:

```
RMC> power on  
Power button is OFF
```

quit

The **quit** command exits RMC and returns the terminal to the server's COM1 port.

You must enter the entire word for the command to take effect.

```
RMC> quit  
Returning to COM port
```

reset

The **reset** command is equivalent to pushing the Reset button on the operator control panel.

The **reset** command restarts the system. The terminal exits RMC and reconnects to the server's COM1 port. You must enter the entire word for the command to take effect.

```
RMC>reset  
Returning to COM port
```

send alert

The **send alert** command forces an alert condition.

This command is used to test the setup of the dial-out alert function. It is issued from the local terminal.

As long as no one connects to the modem and there is no alert pending, the alert will be sent to the pager immediately.

If the pager does not receive the alert, recheck your setup.

```
RMC> send alert  
Alert detected!
```

set alert

The **set alert** command sets the alert string that is transmitted through the modem when an alert condition is detected.

Set the alert string to the phone number of the modem connected to the remote system. The alert string is appended after the dial string, and the combined string is sent to the modem.

The example shown below is generic. Because paging services vary, be sure to listen to the options provided by the paging service to determine the appropriate delay and the menu options.

```
RMC> set alert
Alert String: , , , , , 5085553332#;
RMC>
```

For more information on the alert string, see Section 6.6.5.

set com1_mode

The **set com1_mode** command specifies the COM1 data flow paths, so that data either passes through the RMC or bypasses it.

By default all data passes through the RMC. Data and control signals flow from the system COM1 port, through the RMC, and to the active external port, or the 9-pin modem port. If a modem is connected, the data goes to the modem. This mode is called Through mode.

You can enter the RMC from only the modem port. Only one session can be active at a time.

For modem connection, you can set the **com1_mode** environment variable to allow data to partially or completely bypass the RMC. The bypass modes are Snoop mode, Soft Bypass mode, and Firm Bypass mode. If the **com1_mode** value has been set to **soft_bypass**, and the system is turned off, the mode reverts to Snoop.

- In Snoop mode, you can type an escape sequence to enter the RMC. RMC mode provides a command-line interface for issuing commands to monitor and control the system.
- In Soft Bypass mode, you cannot enter the RMC. But if an alert condition or loss of carrier occurs, the RMC switches into Snoop mode. From Snoop mode you can enter RMC.
- In Firm Bypass mode you cannot enter the RMC. To enter, reset the **com1_mode** environment variable from the SRM console.

NOTE: *You can always enter the RMC locally regardless of the current mode.*

You can set **com1_mode** to one of the following values:

through	All data passes through RMC and is filtered for the escape sequence. This is the default.
snoop	Data partially bypasses RMC, but RMC taps into the data lines and listens passively for the escape sequence.
soft_bypass	Data bypasses RMC, but RMC switches automatically into Snoop mode if loss of carrier occurs.
firm_bypass	Data bypasses RMC. RMC remote management features are disabled.

Example

```
RMC> set com1_mode
Com1_mode (THROUGH, SNOOP, SOFT_BYPASS, FIRM_BYPASS)
```

set dial

The **set dial** command sets the string to be used by the RMC to dial out when an alert condition occurs.

The dial string must be in the correct format for the attached modem. If a paging service is to be contacted, the string must include the appropriate modem commands to dial the number. The dial string is case sensitive. The RMC automatically converts all alphabetic characters to uppercase.

```
RMC> set dial
Dial String: ATXDT9,15085553333
RMC>
```

For more information, see Section 6.6.5.

set escape

The **set escape** command sets a new escape sequence for invoking RMC.

The escape sequence can be any character string, not to exceed 14 characters. A typical sequence consists of two or more control characters. It is recommended that control characters be used in preference to ASCII characters. Use the **status** command to verify the escape sequence.

Be sure to record the new escape sequence. If you forget the escape sequence, you must reset the RMC to the factory defaults. (See Section 6.7.)

The following example consists of two instances of the Esc key and the letters “FUN.” The “F” is not displayed when you set the sequence because it is preceded by the escape character.

```
RMC> set escape
Escape Sequence: un
RMC> status
.
.
.
Escape Sequence: ^[^[FUN
```

set init

The **set init** command sets the modem initialization string.

The initialization string is limited to 31 characters and can be modified, depending on the type of modem used.

```
RMC> set init
Init String: AT&F0E0V0X0S0=2
RMC>
```

Because the modem commands disallow mixed cases, the RMC automatically converts all alphabetic characters entered in the init string to uppercase.

The RMC automatically configures the modem's flow control according to the setting of the SRM **com1_flow** environment variable. The RMC also enables the modem carrier detect feature to monitor the modem connectivity.

set logout

The **set logout** command sets the amount of time before the RMC terminates an inactive modem connection. The default is 20 minutes.

The settings are in tens of minutes, 0–9. The zero (0) setting disables logout. With logout disabled, the RMC never disconnects the idle modem session.

The following example sets the logout timer to 30 minutes.

```
RMC> set logout
Logout Time (0-9 tens of minutes): 3
```

set password

The **set password** command allows you to set or change the password that is prompted for at the beginning of a modem session.

A password must be set to enable access through a modem. The string cannot exceed 14 characters. For security, the password is not echoed on the screen. When prompted for verification, type the password again. If you mistype, reenter the **set password** command.

```
RMC> set pass
RMC Password: ****
Verification: ****
*** ERROR - Verification failed, password is not set ***
RMC> set pass
RMC Password: ****
Verification: ****
```

set user

The **set user** command allows you to set a user string to be displayed in the status command.

You may want to make notes regarding the system. The string is limited to 63 characters and is displayed in the User String field when you enter the **status** command.

In this example, the operator leaves a reminder that a power supply needs to be replaced.

```
RMC> set user
User String: need to replace P/S
RMC> status
PLATFORM STATUS
.
.
.
User String: need to replace P/S
```

status

The **status** command displays the system status and the current RMC settings. See Section 6.6.1 for details and an example.

6.9 Troubleshooting Tips

Table 6–3 lists possible causes and suggested solutions for symptoms you might see.

Table 6–3 RMC Troubleshooting

Symptom	Possible Cause	Suggested Solution
You cannot enter the RMC from the modem.	The RMC may be in soft bypass or firm bypass mode.	Issue the show com1_mode command from SRM and change the setting if necessary. If in soft bypass mode, you can disconnect the modem session and reconnect it.
The terminal cannot communicate with the RMC correctly.	System and terminal baud rates do not match.	Set the baud rate for the terminal to be the same as for the system. For first-time setup, suspect the console terminal, since the RMC and system default baud is 9600.
RMC will not answer when the modem is called.	Modem cables may be incorrectly installed.	Check modem phone lines and connections.
	RMC remote access is disabled or the modem was power cycled since last being initialized.	From the local serial terminal or VGA monitor, enter the set password and set init commands, and then enter the enable remote command.
	The modem is not configured correctly.	Modify the modem initialization string according to your modem documentation.

Table 6-3 RMC Troubleshooting (Continued)

Symptom	Possible Cause	Suggested Solution
RMC will not answer when modem is called. (continued from previous page)	On AC power-up, RMC defers initializing the modem for 30 seconds to allow the modem to complete its internal diagnostics and initializations.	Wait 30 seconds after powering up the system and RMC before attempting to dial in.
After the system is powered up, the COM1 port seems to hang or you seem to be unable to execute RMC commands.	There is a normal delay while the RMC completes the system power-on sequence.	Wait about 40 seconds.
New escape sequence is forgotten.		RMC console must be reset to factory defaults.
During a remote connection, you see a “+++” string on the screen.	The modem is confirming whether the modem has really lost carrier. This is normal behavior.	
The message “unknown command” is displayed when you enter a carriage return by itself.	The terminal or terminal emulator is including a line feed character with the carriage return.	Change the terminal or terminal emulator setting so that “new line” is not selected.
The RMC does not display power-up or fatal messages.	The COM1 setting must be in through mode.	Issue the show COM1_mode command from SRM and change setting if necessary. The COM1_mode may also be changed through the RMC CLI.

Chapter 7

Troubleshooting

This chapter describes procedures for basic troubleshooting. The following topics are covered:

- Error Beep Codes
- Diagnostic LEDs on OCP
- Power Problems
- Console-Reported Failures
- Boot Problems
- Thermal Problems and Environmental Status
- Operating System Reported Failures
- Memory Problems
- PCI Bus Problems
- SCSI Problems
- Fail-Safe Booter Utility

Before you begin troubleshooting your system, consult your service agreement to determine how much troubleshooting and repair you should undertake yourself.

If you have a self-maintenance contract, use the information in this guide and the *DS25 Service Guide* to help identify and resolve the problem.

7.1 Error Beep Codes

Audible beep codes announce errors encountered while the system is powering up. For example, if the firmware in flash ROM is unavailable, you would hear a 1-1-4 beep code (one beep, a pause, a another beep, a pause, and a burst of four beeps). Table 7-1 identifies the error beep codes.

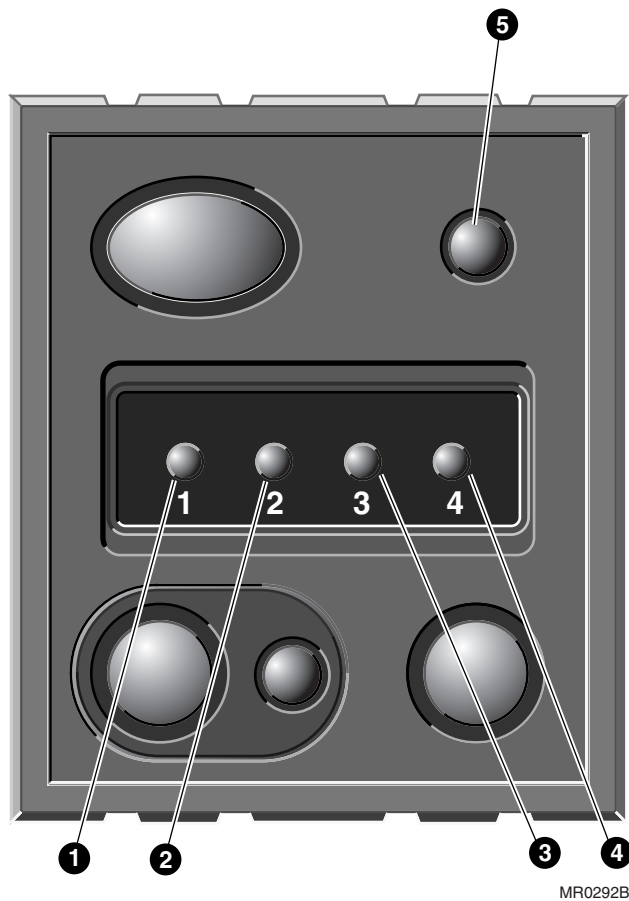
Table 7-1 Error Beep Codes

Beeps	Message/Meaning
1-1-4	SROM code is unable to load the console code; a flash ROM header area or checksum error has been detected. See Section 3.4.1.
1	SROM code has completed execution. System jumps to SRM console. You should start to see SRM messages. If no messages are displayed, there is a problem. See Section 3.4.1.
2-1-2	Configuration error on CPU n (n is 0, 1) or system configuration error(s). The system will still power up. Contact your service provider.
1-2-4	Back-up cache (B-cache) error. A CPU is bad. Contact your service provider.
1-3-3	No usable memory detected. Some memory DIMMs may not be seated properly, or some DIMM sets may be faulty.

7.2 Diagnostic LEDs on OCP

Diagnostic LEDs on the operator control panel indicate error conditions and power-up information. When the green power LED is lit, use Table 7-2 and Table 7-3. When the green power LED is not lit, use Table 7-4.

Figure 7-1 LED Patterns During Power-Up (Rack Orientation)



In Table 7–2 and Table 7–3, the green power LED ⑤ is On in all cases except for two. These two cases are indicated in the table. In Table 7–4 the green power LED is always Off (● = On / ○ = Off).

Table 7–2 System Warning Messages

LED 1	LED 2	LED 3	LED 4	Problem Condition
●	●	○	○	PS0 failed
○	●	○	○	PS1 failed
●	○	○	○	PS2 failed
○	○	○	○	Warning – Use the RMC to view specific failure (See Chapter 6).

Table 7–3 System Power-Up Messages

LED 1	LED 2	LED 3	LED 4	Power-Up Message
○	○	○	●	RMC power-up done
○	○	○	●	5 volt aux (No green LED ⑤)
○	○	○	●	System down (No green LED ⑤)
○	○	●	●	Bulk OK
○	●	○	●	System DC OK
●	○	○	●	System up
○	●	●	●	Verify fan speed
●	●	●	○	Bad RMC flash

NOTE: *If the RMC flash is bad, the system will still come up; however, the bad RMC flash LED will remain lit until a new RMC flash image is loaded. RMC will not have full functionality, use COM2 or VGA display to flash the RMC.*

Table 7-4 Fatal Errors and System Is Down

LED 1	LED 2	LED 3	LED 4	Power-Up Message
●	●	●	●	Door open too long
○	●	●	●	CPU0 failed
●	○	●	●	CPU1 failed
○	○	●	●	VTERM or CTERM failed
●	●	○	●	Both system fans failed
○	●	○	●	CPU fan0 failed
●	○	○	●	CPU fan1 failed
●	●	●	○	Over temperature failure
○	●	●	○	CPU0 missing
●	○	●	○	TIG error
○	○	●	○	Bad CPU data
●	●	○	○	PS configuration error
○	●	○	○	Power supply 2.5 volt failure
●	○	○	○	Bad DPR

7.3 Power Problems

Table 7-5 Troubleshooting Power Problems

If the power indicator is:	Check:
Off	<ul style="list-style-type: none">• Front-panel power switch• Power at the wall receptacle• AC cord• Power cable connectors• Side cover (pedestal) or top cover (rack). Interlocking sensor switch shuts off power if the cover is removed. <p>Unplug the power cords for 15 seconds, then reconnect.</p>
On for a few seconds and then goes Off	<p>Power supply fan. Listen to hear if the power supply fan is spinning at power-up. A failure of the fan causes the system to shut down after a few seconds.</p> <p>NOTE: <i>The power supply shuts off within one second if its internal fan fails.</i></p>
On, but the monitor screen is blank	<ul style="list-style-type: none">• Monitor power indicator is On.• Video cable is properly connected.• SRM console environment variable setting. <p>NOTE: <i>A black raster is displayed if the console environment variable is set to serial mode rather than graphics mode.</i></p>

7.4 Console-Reported Failures

Table 7-6 Troubleshooting Console-Reported Failures

Symptom	Action
Power-up tests do not complete.	Use error beep codes or console serial terminal to determine what error occurred. Check the power-up screen for error messages.
Console program reports an error.	Interpret the error beep codes at power-up and check the power-up screen for a failure detected during self-tests. Examine the console event log (use the more el command) to check for embedded error messages recorded during power-up. If the power-up screen or console event log indicates problems with mass storage devices or PCI devices, or if devices are missing from the show config display, see Section 7.10. Use the SRM test command to verify the problem.

7.5 Boot Problems

Table 7-7 Troubleshooting Boot Problems

Problem/Possible Cause	Action
Operating system (OS) software is not installed on the hard disk drive.	Install the operating system and license key.
Target boot device is not listed in the SRM show device or show config command.	Check the cables. Are the cables oriented properly and not cocked? Are there bent pins? Check all the SCSI devices for incorrect or conflicting IDs. Refer to the device's documentation.
System cannot find the boot device.	SCSI termination: The SCSI bus must be terminated at the end of the internal cable and at the last external SCSI peripheral. Use the SRM show config and show device commands. Use the displayed information to identify target devices for the boot command, and verify that the system sees all of the installed devices. If you are attempting to use bootp, first set the following variables as shown: P00>>>set ewa0_inet_init BOOTP P00>>>set ewa0_protocols BOOTP

Table 7-7 Troubleshooting Boot Problems (Continued)

Problem/Possible Cause	Action
System does not boot.	Verify that no unsupported adapters are installed.
Environment variables are incorrectly set. This could happen if the main logic board has been replaced, which would cause a loss of the previous configuration information.	Use the SRM show and set commands to check and set the values assigned to boot-related variables such as auto_action , bootdef_dev , and boot_osflags .
System will not boot over the network.	For problems booting over a network, check the ew*0_protocols , ei*0_protocols or eg*0_protocols environment variable settings: Systems booting from a <i>Tru64 UNIX</i> server should be set to bootp ; systems booting from an <i>OpenVMS</i> server should be set to mop . Run the test command to check that the boot device is operating.

7.6 Thermal Problems and Environmental Status

Overtemperature conditions can cause the system to shut down.

The DS25 system operates in an ambient temperature range of 10°C–35°C. Internal sensors monitor system and power supply temperature and shut down the system if maximum limits are exceeded. If the system shuts down unexpectedly:

- Ensure that the side cover (pedestal) or top cover (rack) are properly secured.
- Verify that the ambient temperature does not exceed the specified limits.
- Make sure there are no obstructions to the airflow at the front or rear of the system.
- Check to see that the cables inside the system are properly dressed. A dangling cable can impede airflow to the system.

Troubleshooting with show power command

The **show power** command can help you determine if environmental problems necessitate the replacement of a power supply, system fan, or CPU.

Show power indicates:	Action
Bad power supply (in a redundant configuration)	Replace the bad supply. You do not have to shut down the system as long as two supplies are operating.
Bad system fan	Fan must be replaced. Contact HP Services.
Bad CPU fan	CPU must be replaced. Replace it or contact HP Services for assistance.
Bad temperature	The problem could be a bad fan or an obstruction to the airflow. Check the airflow first. If there is no obstruction, contact HP Services to replace the bad fan.

7.7 Operating System Reported Failures

Table 7-8 Operating System Reported Failures

Symptom	Action
System is hung or has crashed.	<p>If possible, halt the system with the Halt button or the RMC halt command. Then enter the SRM crash command and examine the crash dump file.</p> <p>Refer to the <i>Guide to Kernel Debugging</i> (AA-PS2TD-TE) for information on using the Tru64 UNIX Crash utility.</p>
Errors have been logged and the operating system is up.	Examine the operating system error log files.

7.8 Memory Problems

Table 7-9 Troubleshooting Memory Problems

Symptom	Action
DIMMs ignored by system, or system unstable. System hangs or crashes.	Ensure that each memory array has identical DIMMs installed.
DIMMs failing memory power-up self-test.	Try another set of four DIMMs.
DIMMs may not have ECC bits.	Some third-party DIMMs may not be compatible with DS25 systems. Ensure memory DIMMs are qualified.
Noticeable performance degradation. The system may appear hung or run very slowly.	This could be a result of hard single-bit ECC errors on a particular DIMM. Check the error logs for memory errors. Ensure memory DIMMs are qualified.

7.9 PCI Bus Problems

PCI bus problems at startup are usually indicated by the inability of the system to detect the PCI device. The following steps can be used to diagnose the likely cause of PCI bus problems.

1. Confirm that the PCI option card is supported and has the correct firmware and software versions.
2. Confirm that the PCI option card and any cabling are properly seated.
3. Check for a bad PCI slot by moving the last installed PCI controller to a different slot.
4. Call the option manufacturer for help.

PCI Parity Error

Some PCI devices do not implement PCI parity, and some have a parity generating scheme that may not comply with the PCI specification. In such cases, the device should function properly if parity is not checked.

Parity checking can be turned off with the **set pci_parity off** command so that false PCI parity errors do not result in machine check errors. However, if you disable PCI parity, no parity checking is implemented for any device. Turning off PCI parity is therefore not recommended or supported.

7.10 SCSI Problems

SCSI problems are generally manifested as data corruption, boot problems, or poor performance.

Check SCSI bus termination.

- Cable is properly seated at system board or option connector.
- Bus must be terminated at last device on cable or at physical cable end.
- No terminators in between.
- Old 50-pin (narrow) devices must be connected with wide-to-narrow adapter (SN-PBXKP-BA). Do not cable from the connector on the card.
- Using 50-pin devices on the bus may significantly degrade performance.

Any external drives must be connected to their associated card, and these cards must have no internal drives connected to them. Use a separate external controller card.

- Ultra-wide SCSI has strict bus length requirements.
- SCSI bus itself cannot handle internal plus external cable.
- Use a separate card for external devices and terminate properly.

7.11 Fail-Safe Booter Utility

The fail-safe booter (FSB) is another variant of the SRM console. The FSB provides an emergency recovery mechanism if the firmware image contained in flash memory becomes corrupted. You can run the FSB and boot another image from a CD-ROM or network that is capable of reprogramming the flash ROM.

Use the FSB when one of the following failures at power-up prohibits you from getting to the console program:

- Firmware image in flash memory corrupted
- Power failure or accidental power-down during a firmware upgrade
- Error in the nonvolatile RAM (NVRAM) file
- Incorrect environment variable setting
- Driver error

7.11.1 Starting the FSB Automatically

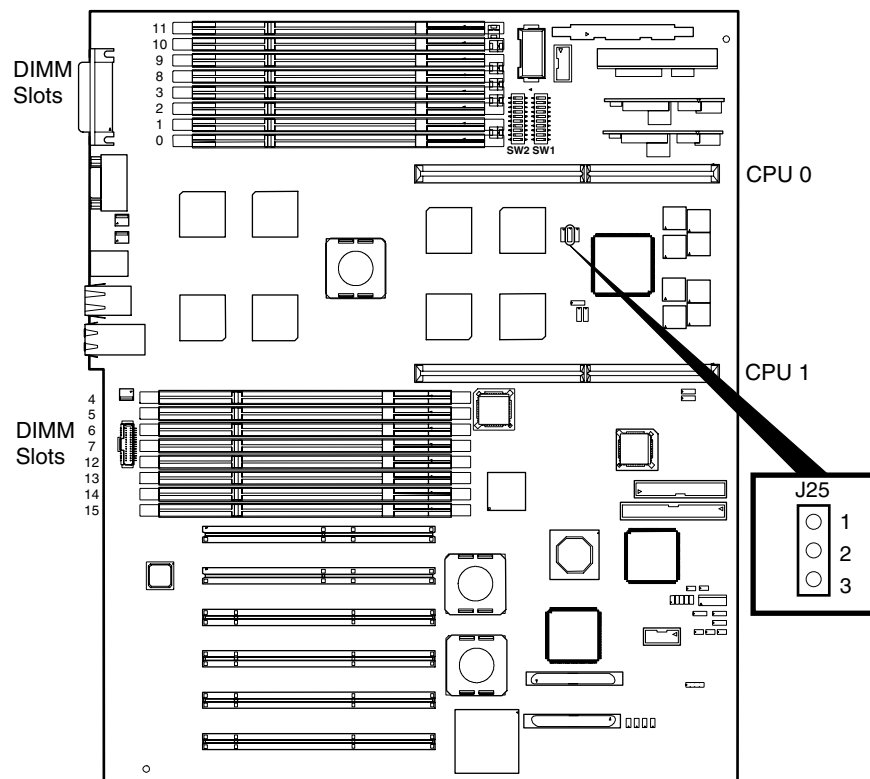
If the firmware image is unavailable when the system is powered on or reset, the FSB runs automatically.

1. Reset the system to restart the FSB. The FSB loads from the flash.
2. Update the firmware as described in Section 7.11.4.

7.11.2 Starting the FSB Manually

1. Power the system off, unplug the power supplies, and remove the cover.
2. Remove CPU0 to gain access to J25 jumper on the system board. See Figure 7-2.
3. Move jumper from pins 1-2 to 2-3 on J25.
4. Reconnect CPU0.
5. Reconnect the power supplies and reinstall the system cover. Power up the system to the FSB console.

Figure 7-2 FSB Switch "On" Setting (Rackmount Orientation)



MR0446

7.11.3 Required Firmware

The required firmware for your system is preloaded onto the flash ROM. Copies of the firmware files are included on your distribution CD. You can also download the latest firmware files from the Alpha systems firmware Web site:

<ftp://ftp.digital.com/pub/Digital/Alpha/firmware/readme.html>

The utilities that are used to reload or update the firmware expect to find the files on a CD.

7.11.4 Updating Firmware

Be sure to read the information on starting the FSB before continuing with this section.

Example 7-1 Running LFU

```
P00>>> lfu
```

```
Checking dqa0.0.0.16.0 for the option firmware files. . .
dqa0.0.0.16.0 has no media present or is disabled via the RUN/STOP switch
Checking dva0.0.0.1000.0 for the option firmware files. . .
```

```
Option firmware files were not found on CD or floppy.
If you want to load the options firmware,
please enter the device on which the files are located(ewa0),
or just hit <return> to proceed with a standard console update: dqa0
Please enter the name of the options firmware files list, or
Hit <return> to use the default filename (ds25fw.txt)  :
Copying ds25fw.txt from dqa0. . .
Copying DFXAA320 from dqa0. . .
Copying KZPSAA12 from dqa0. . .
Copying CIPCA420 from dqa0. . .
Copying FC2381A4 from dqa0. . .
Copying KG8381A4 from dqa0. . .
Copying PCCFWQ16 from dqa0. . .
Copying PCCSM112 from dqa0. . .
```

```
***** Loadable Firmware Update Utility *****
```

Function	Description
Display	Displays the system's configuration table.
Exit	Done exit LFU (reset).
List	Lists the device, revision, firmware name, and update revision.
Update	Replaces current firmware with loadable data image.
Verify	Compares loadable and hardware images.
? or Help	Scrolls this function table.

```
UPD>
```

```
UPD> update
```

```
.
.
.
```

```
UPD> exit
```

Perform the following steps to update the console firmware. Refer to Example 7–1.

1. Insert the Alpha Firmware CD named DS25SRM.ROM into the CD-ROM drive.
2. At the SRM console prompt, issue the **lfu** command. This command invokes the Loadable Firmware Update (LFU) utility.
3. At the UPD> prompt, enter the **update** command.
4. After the update has completed, enter the **exit** command to exit the utility

Chapter 8

Specifications

This chapter contains the following system specifications and requirements:

- Physical Specifications
- Environmental Specifications
- Electrical Specifications
- Acoustical Data
- Power Cord Requirements

8.1 Physical Specifications

Table 8-1 Physical Specifications

Pedestal		
Dimensions (HxWxD)	18.5 x 8.85 x 27.5 in. / 47.0 x 22.5 x 69.9 cm	
Shipping Dimensions	24 x 26.25 x 40 in. / 61.0 x 66.0 x 101.6 cm	
Weight		
Typical Configuration	80 lb / 36 kg	
Maximum Configuration	88 lb / 40 kg	
Shipping Weight		
Nominal	100 lb / 45 kg	
Maximum	110 lb / 50 kg	
Clearances	Operating	Service
Front	15 in. / 38.1 cm	15 in. / 38.1 cm
Rear	6 in. / 15 cm	29.5 in. / 75 cm
Left Side	None	None
Right Side	None	None

Table 8-1 Physical Specifications (Continued)

Rackmount		
Dimensions (HxWxD)	8.75 x 17.5 x 26 in. / 22.2 x 44.5 x 66.0 cm (5U)	
Shipping Dimensions	24 x 26.25 x 40 in. / 61.0 x 66.0 x 101.6 cm	
Weight		
When lifting:	Nominal 80 lb /36 kg	Maximum 86 lbs/39 kg
Total added to cabinet (brackets, slides, cables):	Nominal 84 lb/38 kg	Maximum 88 lbs/40 kg
Shipping Weight	Nominal 100 lb /45 kg	Maximum 110 lbs/50 kg
Clearance for Service	Minimum 4 ft / 121.9 cm, 28 in. / 71 cm withdrawal on rails	
Rackmount Cabinet		
	H9A10 M-Series	H9A15 M-Series
Dimensions (HxWxD)	67 x 23.6 x 43.27 in./ 170 x 60 x 110 cm	79 x 23.6 x 35.4 in. 200 x 60 x 90 cm
Shipping Dimensions	73 x 36 x 48 in. / 185.5 x 91.5 x 122 cm	85 x 36 x 48 in. / 216 x 91.5 x 122 cm
Weight	Configuration dependent	Configuration dependent
Shipping Weight	Configuration dependent, maximum payload 1,000 lb	1056 lb / 550 kg (normal) 1,408 lb / 640 kg (maximum)

8.2 Environmental Specifications

Table 8-2 Environmental Specifications

Temperature		
Operating (Pedestal, Rackmount)	50° to 95°F / 10° to 35°C	
Storage (60 days)	−40° to −151°F / −40 to −66°C	
Rate of change	20°F/hr / 11°C/hr	
Relative Humidity		
Operating	20% to 80%	
Non-operating	20% to 80%	
Storage (60 days)	10% to 95%	
Rate of change	20% hr	
Maximum Wet Bulb Temperature	Operating 82°F / 28°C	Storage (60 days) 115°F / 46°C
Maximum Dew Point Temperature	Operating 36°F / 2°C	Storage (60 days) Not tested
Heat Dissipation	Nominal	Maximum
Pedestal	550W, 1,878 BTU/hr	780W, 2,664 BTU/hr
H9A10/H9A15 Cabinets	Configuration dependent	

8.3 Electrical Specifications

Table 8-3 Electrical Specifications

Nominal Voltage (Vac)	100	120	200–240
Voltage Range (Vac) temporary condition	90–100	110–128	180–250
Power Source Phase	1–3	1–3	1–3
Nominal Frequency (Hz)	50/60	50/60	50/60
Frequency Range (Hz)	49–51/59–61	49–51/59–61	49–51/59–61
RMS Current (maximum steady state)			
<i>Pedestal and Rackmount</i>			
Each cord, two PS	5.2A	4.2A	2.5A
Each cord, three PS	3.6A (3x for rack)	3.0A (3x for rack)	1.75A (3x for rack)
Maximum VA	1035	1010	975
<i>M-series Cabinet (configuration dependent)</i>			
Nominal voltage (Vac)	100	120	220–240
Each nominal voltage (Vac)	24A	24A	16A
Power Cords			
Pedestal	3 (75 in. / 190 cm)	EC 320 C13 to NEMA 5-15 (N. America) or IEC 320 C13 to country-specific	
Rackmount	3 (14 ft 10 in. / 452 cm)	IEC 320 C13 to NEMA 5-15 (N. America) or IEC 320 C13 to IEC 320 C14 (other countries)	
Cabinet	2 (10 ft 10 in. / 330 cm)	120V non-removable NEMA L5-30P or 200–240V non-removable IEC 309	

Table 8–3 Electrical Specifications (Continued)

Product Safety Approvals	UL: Listed to UL1950 (3rd edition) CSA: Certified to CAN/CSA-C22.2 No. 950-M95 TUV: EN 60950/A11: 1997 VDE 0805 GS marked CB Test Certificate: EN60950/A4:1997	
Reviewed to	AS/NZ 3260:1993 Australian/New Zealand Standard EN 60950/A4: 1997 European Norm IEC 950 (2 nd edition, 4 th amend)	
EMC Approvals	FCC: Part 15, SubPart B (CFR 47, 1995) Class B CE: EN 55022 (CISPR 22) – Electromagnetic Interference EN55024 (IEC61000-4-2, 3, 4, 5, 6, 8, 11) – Electromagnetic Immunity EN61000-3-2 (IEC61000-3-2) – Power Line Harmonics EN61000-3-3 (IEC61000-3-3) – Power Line Flicker VCCI: V-3/97.04 Class B BSMI: CNS13438 Class A C-Tick: AS/NZS 3548:1995 Class B	
NOTE: <i>Power supplies are universal, PFC, auto ranging, 100/240 Vac.</i>		
Airflow and Quality		
Intake location	Front	
Exhaust location	Rear Pedestal, Rack; Rear/top H9A10/H9A15	
Altitude	Operating 10,000 ft / 3,037m	Non-operating 40,000 ft / 12,192m
Vibration	Operating	10–500 Hz .1 G peak
Mechanical shock	Pedestal	M-series cabinet
Operating	7.5 G, 10 +/- 3 ms	5.0 G, 10 +/- 3 ms

8.4 Acoustical Data

Table 8–4 lists the noise declaration for the DS25 system.

Table 8–4 Acoustical Data

Acoustics — Declared Values per ISO 9296 and ISO 7779

	L_{wAd} B		L_{pAm} dBA (bystander positions)	
	Idle	Operate	Idle	Operate
AlphaServer DS25	6.3	6.4	45	46

Current values for specific configurations are available from HP representatives.
1 B = 10 dBA.

8.5 Power Cord Requirements

The power cord set meets the requirements for use in the country where you purchased your equipment. Power cord sets for use in other countries must meet the requirements of the country where you use the system. For more information on power cord set requirements, contact your Authorized HP Dealer.

8.5.1 General Requirements

The requirements listed below apply to all countries.

- The length of the power cord must be at least 6.0 ft (1.8 m) and a maximum of 12 ft (3.7 m).
- The power cord set must be approved by an acceptable accredited agency responsible for evaluation in the country where the power cord will be used.
- The power cord set must have a minimum current capacity and nominal voltage rating of 10A/125 volts AC, or 10A/250 volts AC, as required by each country's power system.
- The appliance coupler must meet the mechanical configuration of an EN60320/IEC 320 Standard Sheet C13 Connector, for mating with the appliance outlet on the system.

8.5.2 Country-Specific Requirements

Table 8-5 Power Cord Requirements by Country

Country	Accredited Agency	Applicable Note Numbers
Australia	EANSW	1
Austria	OVE	1
Belgium	CEBC	1
Canada	CSA	2
Denmark	DEMKO	1
Finland	SETI	1
France	UTE	1
Germany	VDE	1
Italy	IMQ	1
Japan	JIS	3
Norway	NEMKO	1
Sweden	SEMKO	1
Switzerland	SEV	1
United Kingdom	BSI	1
United States	UL	2

NOTES:

1. Flexible cord must be <HAR> Type HO5VV-F, 3-conductor, 1.0 mm² conductor size. Power cord set fittings (appliance coupler and wall plug) must bear the certification mark of the agency responsible for evaluation in the country where it will be used.
2. Flexible cord must be Type SVT or equivalent, No. 18 AWG, 3-conductor. Wall plug must be a two-pole grounding type with a NEMA 5-15P (15A, 125V).
3. Appliance coupler, flexible cord, and wall plug must bear a "T" mark and registration number in accordance with the Japanese Dentori Law. Flexible cord must be Type VCT or VCTF, 3-conductor, 1.0 mm² conductor size. Wall plug must be a two-pole grounding type with a Japanese Industrial Standard C8303 (7A, 125V) configuration.

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